UTS UNIVERSITY OF TECHNOLOGY SYDNEY

# Examining the Role of Communication Disability in the Hospital Falls of Patients with Stroke

**by Rebecca Sullivan:**

Thesis submitted in fulfilment of the requirements for the degree of

**Doctor of Philosophy: Speech Pathology**

under the supervision of Professor Bronwyn Hemsley, Professor Katherine Harding and Doctor Ian Skinner

University of Technology Sydney
Graduate School of Health

29 February, 2024

Falls in hospital patients with communication disability.

## Certificate Of Original Authorship

I, Rebecca Sullivan, declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy in Speech Pathology, in the Graduate School of at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This research is supported by the Australian Government Research Training Program and Jumbunna Institute Post Graduate Research Scholarship.

Signature: Production Note:
Signature removed prior to publication.

Date: 29 February 2024

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## Dedication

For James.

Bidhi yadhaa ngulunggal. Barramanggarirra nginyal ngulunggal.

Dream big. Love you.

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## Acknowledgements

I would like to acknowledge and pay my respects to the Bunurong/Boonwurrung and the Wurundjeri Woi Wurrung peoples of the Eastern Kulin Nation as the traditional owners and custodians of the land and waterways and thank them for looking after the land on which I live, raise my son, and wrote this thesis. I would also like to acknowledge the Gadigal people of the Eora nation upon whose ancestral lands the University of Technology Sydney now stands.

My journey into research began in 2015 when a colleague asked me what I was going to do about a problem I had been complaining about. The problem was that communication disability was not discussed when patients with whom I was working experienced a fall in hospital. I took this idea to a research open forum, where Professor Katherine Harding helped shape it into a question and study design. From the very beginning, Katherine has supported my journey with wise words, advice on career pathways, explanations of statistics, and advice and feedback on numerous drafts of publications and conference presentations before and during this PhD. Without Katherine, this journey would not even have begun and, without her encouragement, certainly would not have led me to a PhD.

A tweet by a conference attendee about our early research caught the eye of Professor Bronwyn Hemsley, who invited me to apply for the PhD program at University of Technology Sydney. Throughout my candidature, Bronwyn has provided me with endless opportunities to develop my skills in research, consistent encouragement to keep going, and reminders of the importance of this topic and that it matters. Bronwyn has suffered through my early attempts at academic writing and provided a huge amount of feedback to help shape my dot points into sentences and develop my ethics applications and journal articles, one oxford comma at a time. Her

belief that I could do this never wavered. Bronwyn has often reminded me to take care of myself, pointing out that sometimes other life events take precedence, and supported my wellbeing.

Dr Ian Skinner joined the supervision team at the beginning of the PhD and has been my voice of calm and reason throughout the journey. Ian has the ability to pose questions or make comments that allow reflection and remind me that the patient is at the centre of this research. Ian's feedback and advice helped maintain the focus on the bigger pictures—the thesis, the research, the patient, and the hospital system—while guiding the small steps that shape the focus.

Thank you to Bronwyn, Katherine and Ian, my supervisors. You all believed that my research question was important and that the findings could contribute to the safety of patients with communication disability. Together, you guided me and ensured I delivered the results. Each of you invested your time and specialist expertise, and I am very grateful.

I am also grateful for the financial support I received during my candidature. The award of a Jumbunna Institute Postgraduate Research Scholarship and an Australian Government Research Training Program Scholarship allowed me to dedicate the necessary amount of time to the research. The University of Technology Sydney also provided support in the form of a laptop, an annual stipend for attendance at conferences, and publication of an open access journal article as part of the Wiley-University of Technology Sydney agreement via the Council of Australian University Librarians. I would also like to acknowledge that a late version of this thesis was proofread by Dr Cherry Russell.

I want to express my gratitude to Dr Amy Freeman-Sanderson for being a supportive mentor, colleague, and friend throughout my PhD journey. Working with

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Amy has deepened my understanding of research methods and given me the opportunity to develop research skills outside of my PhD and to make a new friend. Thank you, Amy, for blending mentorship with friendship and joining me on this journey.

Throughout this journey my friends have provided endless support and encouragement, especially Jane Elise Cherry, Jacqueline Ryan, Paddy and Amanda Sheridan, Marnie Hodsdon, Stefan Ochsenbein and my tribe of school parent friends. Thank you for your ongoing encouragement and belief that I could actually do this, for asking about progress without ever asking if I was finished yet and showing genuine interest in the topic and results.

My Mum and Dad have worked very hard to give us the educational opportunities they did not have. You wanted me to succeed and gave me every opportunity to do so. Thank you for telling me to accept the offer to study, that I had "started so had to keep going now", and even when it was "dragging on a bit", reminding me that I had come too far to not finish. I am looking forward to actually spending time with you when you visit now. Thank you to Paul Sullivan and Dee Powlay-Sullivan who have been nothing but supportive and encouraging, constantly reminding me I am capable, and asking to read my publications. To my many siblings and in laws I have, thanks for being patient with me. To the children we have welcomed into our home, whether you stayed for one night or six months, you are all the very epitome of resilience.

To (the now) Dr Rebecca Smith and (soon to be Dr) Harmony Turnbull. We did not need to be in the same physical space, or at the same stage in our research journey to have supported each other. You have kept me motivated through Teams, endured my cheesy GIFS and been the sounding board I often needed.

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Finally, my wonderful husband David and son James, without whom I would never have done this. Somehow, we survived not only a PhD, but COVID lockdowns! David, you have been an excellent ‘rubber duck’ as you say, nodding in all the right places, reminding me to stay calm and make a list, taking the extra load when I was unable to, and loving me. James, you are my bestest boy. You have been very patient with me and my thesis, understanding when I wasn’t able to play when you wanted me to. Let’s go to the park, play X-box, finish your model railway, and build an epic Lego city now.

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## Note on Thesis Format and Style

The term speech pathologist is used in accordance with Australian convention, apart from the published chapters of the thesis where the publisher required the term 'speech-language pathologist' to be used. The expression 'people with communication disability following stroke' is used to refer to the general population with this condition, while those in hospital are referred to as 'patients with communication disability following stroke'. First person language is used throughout this thesis.

This thesis follows the referencing and style guidelines of the 7th edition of the *Concise Guide to APA Style: The Official APA style Guide for Students (2020)*. This thesis contains both unpublished (Chapters 1, 5 – 7 and 12) and published chapters (Chapters 2 – 4, 8 – 9). Chapter 10 has been accepted for publication and is currently 2024 and Chapter 11 is in manuscript form. In relation to Chapters 2, 3, and 4, permission was given to include the accepted manuscript, prior to typesetting by the journals. These manuscripts have been formatted to adhere to APA7 in keeping with the style of the unpublished chapters of the thesis, and the references from these chapters have been consolidated into the reference list at the end of the thesis. Chapters 8 and 9 are included as the PDF versions of the manuscripts. As per publisher requirements, these papers adhere to the formatting requirements in which they were published, and their references appear at the end of each chapter as part of the PDF. This thesis is double spaced as per APA7 guidelines except for tables and figures, which are single spaced. Tables and figures are placed within the body of the text close to where they are first referenced. A list of tables and figures for each chapter is provided in the prefatory material.

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## Ethical Approval

This project received ethical approval from Eastern Health Human Research Ethics Committee in March 2020 [HREC/58682/EH-2020-205431(v3). The ethics application was then amended and approved in August 2020 to accommodate for COVID-19 restrictions on data collection for research in hospitals. Each approval was ratified by the University of Technology Sydney Human Research Ethics Committee [ETH19-4306] and noted by Charles Sturt University and La Trobe University Ethics Committees.

The focus groups study received ethical approval from Eastern Health Human Research Committee in November 2021 [HREC/78586/EH-2021-288479(v3)]. The ethics application was then amended and approved in June 2022 and August 2022 to accommodate COVID-19 health service restrictions. Each approval was ratified by the University of Technology Sydney Human Research Ethics Committee [ETH21-7459 and ETH22-7459].

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## Publications and Presentations

### Summary of Research Dissemination

A range of strategies were utilised to disseminate the findings of this body of research (see Table 1). At the time of writing, as shown in Table 3, three literature reviews and two results papers have been published in international, peer reviewed journals and in conference proceedings. The researcher has presented the findings of this research at several international and national conferences and local presentations.

**Table 1**

*Research Dissemination and Impact*

| **Output Method** | **Number** |
|---|---|
| Peer reviewed journal articles | 5 |
| International conferences oral and poster presentations | 5 |
| National conference oral and poster presentations | 7 |
| Twitter posts | 146 |

Peer-reviewed publications are presented below in order of appearance in the thesis. Presentations are presented here in reverse chronological order in each category. Conference abstracts and poster presentations are in Appendix A and B.

### Peer-Reviewed Journal Articles

**Chapter 2**

Sullivan, R., Harding, K., Skinner, I., & Hemsley B. (2020) Falls in hospital patients with acquired communication disability secondary to stroke: A systematic review and meta-analysis. *International Journal of Language & Communication Disorders 55(*6), 837-851. https://doi.org/10.1111/1460-6984.12570

**Chapter 3**

Sullivan, R., Harding, K., Skinner, I., & Hemsley B. (2021) Circumstances and outcomes of falls in hospital for adults with communication disability secondary

to stroke: A qualitative synthesis. *Advances in Communication and Swallowing 24*(2), 99-110. https://doi.org/10.3233/ACS-210028

**Chapter 4**

Sullivan, R., Hemsley, B., Skinner, I., & Harding, K. (2023) Hospital policies on falls in relation to patients with communication disability: A scoping review and content analysis. *Australian Health Review 47*(4), 487 – 493. https://doi.org/10/1071/AH22289

**Chapter 8**

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2023). Falls in patients with communication disability secondary to stroke. *Clinical Nursing Research 32*(3), 478-489. https://doi.org/10.1177/10547738221144214

**Chapter 9**

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023). "Patient unable to express why he was on the floor, he has aphasia." A content thematic analysis of medical records on the falls of hospital patients with communication disability following stroke. *International Journal of Language & Communication Disorders 58,* (2033 – 2048). https://doi.org/10.1111/1460-6984.12916

**Chapter 10**

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (*2024*). "We don't look too much into the communication disability": Clinicians' views and experiences on the falls of hospital patients with communication disability following stroke. *Disability and Rehabilitation.*

**International Peer-Reviewed Conference Presentations**

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2022, November 17-19). *Falls in patients with communication disability secondary to stroke: Medical record and*

*incident report analysis* [Technical Research presentation]. 2022 ASHA Convention, New Orleans, Louisiana, United States.

Sullivan, R., Harding, K., Hemsley, B., & Skinner, I. (2021, December 1 - 3). *Falls in patients with severe communication disability following stroke: A chart review* [5x5 presentation]. 9th Biennial Australia and New Zealand Falls Prevention Conference, Online virtual conference.

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2021, March 22 - 26). *Systematic review and meta-analysis of hospital falls in people with stroke* [Long Oral presentation]. Virtual Pre-Conference Global Injury Prevention Showcase. Online virtual conference.

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2022, November 27 – 30). *Stroke, communication disability, and falls: Analysis of medical records and safety incident reports* [Rapid Fire presentation]. 14th World Conference on Injury Prevention & Safety Promotion, Adelaide, South Australia, Australia.

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2022, November 27 – 30). *Falls, stroke, and communication disability: Content analysis of medical records and incident reports* [Conversation Starter presentation]. 14th World Conference on Injury Prevention & Safety Promotion, Adelaide, South Australia, Australia.

**National Conference Presentations**

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023, August 7 - 9). *"It can be very daunting" Clinician views and experiences on falls in hospital patients with communication disability* [Poster] 15th National Allied Health Conference, Perth, Western Australia, Australia.

Sullivan, R., Harding, K., Skinner, I., & Hemsley (2021, May 31 – 2 June). *A systematic review of falls in hospital patients with left hemisphere stroke and acquired*

*communication disability secondary to stroke* [Poster]. Speech Pathology Australia National Conference 2021, Online virtual conference.

Sullivan, R., Skinner, I., Harding, K., & Hemsley, B. (2021, May 31 – 2 June). *A review of hospital and health service falls policies in Australia: failing to consider or empower people with communication disability* [Poster]. Speech Pathology Australia National Conference 2021, Online virtual conference.

Sullivan, R., Harding, K., Skinner, I., & Hemsley (2020, May 24 – 17). *A systematic review of falls in hospital patients with left hemisphere stroke and acquired communication disability secondary to stroke* [Accepted Conference Presentation]. Speech Pathology Australia National Conference 2020, Darwin, NT, Australia.

**Local Conference Presentations**

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023, July 6). *"Found patient on the floor" Hospital falls in patients with communication disability after stroke*. Presented at the University of Technology Sydney Faculty of Health Three Minute Thesis Competition.

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023, June 21). *"Found patient on the floor" Hospital falls in patients with communication disability after stroke*. Presented at the University of Technology Sydney Graduate School of Health Three Minute Thesis Competition.

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2022, December 7). *"Unable to express reason for trying to get up" Medical record analysis of falls in patients with communication disability following stroke* [Accepted Conference Presentation]. 2022 Eastern Health Research Forum.

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Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2020, December 2) *Falls in hospital patient with acquired communication disability secondary to stroke: A systematic review and meta-analysis*. The Inaugural Speech Pathology Symposium Showcasing Emerging and Established Researchers. Online virtual event.

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2020, October 15). *Falls in hospital patients with acquired communication disability secondary to stroke.* Presented at Eastern Health Three Minute Thesis Competition. Online virtual event.

**Invitations to Speak**

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023, August 17). *Falls in patients with communication disability after stroke.* Presented at Eastern Health Speech Pathology Continuing Professional Development Forum. Online virtual event.

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023, February 15). *Falls in patients with communication disability following stroke, during inpatient rehabilitation.* Presented at Eastern Health Falls Prevention and Post Falls Management Working Party.

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2020, July 15). *Falls in patients with acquired communication disability secondary to stroke: A systematic review and meta-analysis.* Lecture delivered in the Master of Speech Pathology course, Subject 96120 Augmentative and Alternative Communication. The University of Technology Sydney.

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## Awards

- The University of Technology Sydney, Graduate School of Health, 3 Minute Thesis Competition Overall Winner for Best Presentation (2023).
- The University of Technology Sydney, Graduate School of Health, 3 Minute Thesis Competition People's Choice Award (2023).

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## Author Attribution Statement

I am the lead author for all published papers included in this thesis and a description of my role for each study is presented here in Chapter order.

**Chapter 2 Falls in Hospital Patients with Acquired Communication Disability Secondary to Stroke: A Systematic Review and Meta-analysis and Chapter 3 Circumstances and Outcomes of Falls in Hospital for Adults with Communication Disability Secondary to Stroke: A Qualitative Synthesis**

I led the design of the systematic review, completed the database searches, determined the inclusion status of studies, extracted, and analysed data, and wrote the manuscript with feedback from co-authors within their supervisory roles.

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2019) A systematic review of falls in hospital patients with left hemisphere stroke and acquired communication disability secondary to stroke. PROSPERO 2019 CRD42019137199. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019137199

Sullivan, R., Harding, K., Skinner, I., & Hemsley B. (2020) Falls in hospital patients with acquired communication disability secondary to stroke: A systematic review and meta-analysis. *International Journal of Language & Communication Disorders 55(*6), 837-851. https://doi.org/10.1111/1460-6984.12570

Sullivan, R., Harding, K., Skinner, I., & Hemsley B. (2021) Circumstances and outcomes of falls in hospital for adults with communication disability secondary to stroke: A qualitative synthesis. *Advances in Communication and Swallowing 24*(2), 99-110. https://doi.org/10.3233/ACS-210028

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**Chapter 4 Hospital Policies on Falls in Relation to Patients with Communication Disability: A Scoping Review and Content Analysis**

I led the design of the scoping review, completed the search, determined the inclusion of extracted and analysed data, and wrote the manuscript with feedback from co-authors within their supervisory roles.

Sullivan, R., Hemsley, B., Skinner, I., & Harding, K. (2023) Hospital policies on falls in relation to patients with communication disability: A scoping review and content analysis. *Australian Health Review 47*(4), 487 – 493. https://doi.org/10/1071/AH22289

**Chapter 8 Falls in Patients with Communication Disability Secondary to Stroke and Chapter 9 "Patient unable to express why he was on the floor, he has aphasia" A Content Thematic Analysis of Medical Records on the Falls of Hospital Patients with Communication Disability Following Stroke**

I led and completed the design of this study, including the ethics application and amendments, data collection, data analysis and coding, and wrote the manuscripts with input from co-authors in their supervisory roles.

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2023). Falls in patients with communication disability secondary to stroke. *Clinical Nursing Research 32*(3), 478-489. https://doi.org/10.1177/10547738221144214

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023). "Patient unable to express why he was on the floor, he has aphasia." A content thematic analysis of medical records on the falls of hospital patients with communication disability following stroke. *International Journal of Language & Communication Disorders 55,* 2033-2048. http://dx.doi.org/10.1111/1460-6984.12916

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**Chapter 10 "We don't look too much into the communication disability": Clinicians Views and Experiences on the Falls of Hospital Patients with Communication Disability Following Stroke.**

I led and completed the design of this study, including the ethics application and amendments, data collection, data analysis and coding, and wrote the manuscript with input from co-authors in their supervisory roles.

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. *(2024)*. "We don't look too much into the communication disability": Clinicians' views and experiences on the falls of hospital patients with communication disability following stroke. *Disability and Rehabilitation*

**Chapter 11 "Communication disability plays a massive role." Clinical Implications and Recommendations for Management of Falls in Hospital Patients with Communication Disability After Stroke**

I led and completed the design of this study, including the data collection, data analysis and coding, and wrote the manuscript with input from co-authors in their supervisory roles.

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2024). "Communication disability plays a massive role." Clinical implications and recommendations for management of falls in hospital patients with communication disability after stroke. *Manuscript in preparation.*

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## Abstract

People who have experienced a stroke are at a high risk of falls during their inpatient hospital admission. Falls in hospital can result in several adverse consequences to both the patient and the health service. Following a stroke, communication disability is highly prevalent, and people with communication disability may have unique risk factors that may contribute to their falls in hospital.

The overall aim of this thesis was to gain an in depth understanding of the: (a) relationship between falls in inpatient rehabilitation and communication disability following stroke, (b) context, nature, and outcomes of falls for patients with communication disability following stroke, (c) potential strategies that may reduce the risk of falls for patients with communication disability following stroke.

To address the research aims existing literature, including hospital falls policies, were reviewed using a systematic review with meta-analysis, qualitative synthesis, and scoping review. Medical records and incident reports of falls in patients with communication disability following stroke were analysed both descriptively and with a content thematic analysis. Hospital health professionals participated in focus groups that were analysed using content thematic analysis. Finally, a meta-synthesis combined the studies using a content thematic analysis to present clinical implications. The Generic Reference Model patient safety framework guided data collection, analysis, and the reporting of the studies.

The results of the literature reviews indicate that communication disability is not well represented in the literature and in policies concerning hospital falls. However, communication disability following stroke has multiple impacts on the management of falls in hospital. The results of the medical record and incident report reviews indicated that difficulties following simple instructions were a risk factor for a fall. Additionally,

difficulties gaining attention and communicating basic needs were contributing factors for falls. The most common type of fall was an unwitnessed roll from bed and patients often fell when taking a risk or attempting to address an unmet basic need. The results of the medical record and incident report data and focus groups suggested that communication disability made it difficult for health professionals to understand the circumstances of some unwitnessed falls and assess for injury following a fall. The results indicate that current falls prevention strategies do not meet the needs of patients with communication disability. Health professionals suggest that falls prevention for patients with communication disability following stroke needs to include family members, tailored education programs and improved documentation of the functional impacts of communication disability. Hospital falls in patients with communication disability after stroke are complex. Specific functional aspects of communication disability influence falls risk assessment, prevention, and management. Communication disability, may contribute to a fall in hospital for patients with communication disability following stroke. Health professionals should consider the functional implications of a patient's communication disability when considering falls risks and potential contributing factors to falls and implement falls prevention strategies that specifically target the communication disability. Furthermore, hospital managers should consider communication disability when developing and updating falls prevention policies and procedures to support health professionals to provide safer, more effective care for these vulnerable patients. Whilst suggestions to enhance falls prevention strategies for patients with communication disability were discussed, there is an urgent need for research into which strategies may be effective for patients with communication disability after stroke.

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## Thesis Synopsis and Chapter Outline

This thesis is comprised of 12 chapters, including five published manuscripts, one submitted manuscript under peer review at the time of submission, one in preparation for submission and three unpublished chapters providing detail related to the conduct of the research. An introduction chapter provides the background to the research and discussion/conclusion chapter brings the individual studies together into a cohesive body of work.

Chapter 1 introduces the background and aims of this research. It includes a description of the functional impacts of a stroke on a person; the functional implications of communication disability in a hospital setting; and the impact of communication disability on patient safety in a hospital setting. This chapter also describes current research into falls and the aims of this research.

Chapter 2 is a systematic review exploring the association between falls and communication disability following stroke. The results of this systematic review of 15 papers provided mixed results. Studies that included patients with severe communication disability, provided evidence that moderate to severe communication disability may be related to falls in patients in hospital. However, the meta-analysis of 12 of the studies does not provide any evidence to suggest that a generic classification of communication disability following stroke is associated with higher risk of falls in hospital. However, the studies were limited by an under-representation of patients with severe communication disability through exclusion criteria or requirement of functional communication to be able to participate. Chapter 2 is published in *International Journal of Language & Communication Disorders*, with the accepted version presented as per the published copyright guidelines.

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Chapter 3 is a secondary analysis, qualitative synthesis of literature identified in the systematic review described in Chapter 2 that aimed to identify any contributing factors, hazards, and outcomes of falls for this population. The included studies provided scant evidence on the circumstances and outcomes of falls in hospital for patients with communication disability after stroke. Chapter 3 is published in Advances in Communication and Swallowing, with the accepted version presented as per the published copyright guidelines.

Chapter 4 reports a scoping review and content analysis of Australian hospital falls policies to determine how these relate to patients with communication disability. The results indicate that communication disability is rarely captured on falls risk assessment tools and there is little guidance for staff on adapting falls prevention education for patients with communication disability. The potential role for speech pathologists in supporting patients with communication disability in falls management was rarely discussed. Chapter 4 is published in Australian Health Review, with the accepted version presented as per the published copyright guidelines.

Chapters 5, 6 and 7 provide detail about the methodology (i.e., the research paradigm that underpinned the design of the studies), methods (e.g., the data sources and collection, research setting, and participant selection), and the impact of COVID-19 pandemic on the research that follow in chapters 8, 9, and 10. Chapter 5 is an unpublished chapter describing the methodology used within this body of research to address the gaps identified in the literature. This chapter outlines the epistemological, ontological, and theoretical standpoints that were used to guide the development of this research. It also outlines the theoretical lens used to guide the study and how rigour was achieved in the qualitative components of these studies through credibility, transferability, dependability, and confirmability.

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Chapter 6 outlines the impact of the COVID-19 pandemic on this research. This research was completed in Melbourne, Australia during 2019 – 2024 and was significantly impacted by the COVID-19 pandemic restrictions. The restrictions included a lack of access to the health service which required a significant change to the planned research methods. The details of these changes are described in this chapter.

Chapter 7 discusses the mixed methods approach used to examine hospital falls in patients with communication disability following stroke. This chapter discusses the ethical considerations of the research and provides a detailed description of the setting for the research. Further, the chapter outlines the analysis of patient medical record and incident reports using descriptive statistics, and content thematic analysis, as well as content thematic analysis of focus groups.

Chapters 8 – 10 describe studies that aimed to explore the role that communication disability might play in relation to falls in hospital patients with stroke. Chapter 8 is an observational study of patient medical records and incident reports that examines the contributing factors, circumstances, and outcomes of falls in hospital patients with communication disability following stroke. The Generic Reference Model (Runciman et al. 2006) was the analytical lens for analysing the medical record and incident report data. Chapter 8 also includes descriptions of the method specific to this study and the implications of the findings for health professionals and hospital managers. Chapter 8 is published in Clinical Nursing Research and is formatted as per the publication.

In Chapter 9, the medical records and incident reports of a subset of the participants from Chapter 8 were analysed using a content thematic analysis to identify how patient communication is characterised in relation to falls, and their prevention and management strategies. This paper also describes the methods used and discusses the

clinical implications of the findings. Chapter 9 is published in the International Journal of Language & Communication Disorders and appears in its published form.

Chapter 10 reports on the results of focus groups conducted with hospital-based health professionals. Given health professionals have a crucial role in providing falls prevention strategies for hospital patients with stroke, their experiences provide further context and information regarding the impact of communication disability on falls risk and prevention strategies. Chapter 10 is presented as a manuscript accepted for publication the journal Disability and Rehabilitation.

Chapter 11 provides a qualitative meta-synthesis of the research findings of the literature reviews (Chapters 2, 3, and 4) and the medical record and incident report reviews and focus groups (Chapters 8, 9 and 10) and presents a framework to guide clinical practice and further research.

Chapter 12 provides a discussion and conclusion to the research. The discussion includes the implications and limitations of these studies, and directions for future research.

# Chapter 1: Background to the Research

The broad aim of the research reported in this thesis was to examine the role of acquired communication disability in the falls of hospital patients with acquired communication disability secondary to left hemisphere stroke. This chapter introduces the study and explains the key terms and concepts in relation to the topic.

## Stroke

A stroke occurs when blood supply to the brain is suddenly interrupted either by blockage, as in ischaemic stroke, or by rupturing and bleeding in haemorrhagic stroke, (Stroke Foundation, 2023). It is estimated that 67-82% of strokes are ischaemic strokes and 9-11% are haemorrhagic strokes (Feigin et al., 2009). Stroke is one of the leading causes of disability and death worldwide (Strilciuc et al., 2021). For those who survive, stroke can lead to impairments affecting a wide range of functions including mobility, communication, vision, self-care, cognition, and swallowing.

The global disease burden of stroke estimates there were 12.2 million incidents of stroke in 2019 worldwide (eClinicalMedicine, 2023). In Australia, it is estimated that more than 27, 000 people experienced a stroke for the first time in 2020 and more than 445, 000 people are living with the effects of stroke (Stroke Foundation, 2021). The annual financial cost of stroke in Australia is estimated to be $6.2 billion: $1.3 billion in the health system, including inpatient and outpatient care; $3.6 billion in lost productivity, for example in early retirement for survivors or carers leaving the workforce, and $1.3 billion in other costs such as home modifications and equipment, aged care and the National Disability Insurance Scheme (Deloitte Access Economics, 2020).

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**Communication Disability as a Result of Stroke**

Communication disability refers to "the impairments, activity limitations and participation restrictions that affect an individual's ability to interact and engage with the world in ways that are meaningful to them and those they communicate with" (The University of Queensland, n.d.). Over two-thirds of people with stroke have ongoing rehabilitation needs due to difficulties in functioning (Stroke Foundation, 2021). Of these, acquired communication disability is estimated to occur in at least two thirds of stroke survivors (C.Mitchell et al., 2020) and up to half of the total number of patients admitted to stroke wards may have difficulties communicating their healthcare needs. (O'Halloran et al., 2009).

The part of the brain affected by stroke has a significant impact on the impairments and disorders a person may experience. Patients with communication disability secondary to right hemisphere stroke may have communication disability due to impairments in cognition, speech and/or language. Difficulties with aspects of communication affected by cognition are known as cognitive-communication disorders and may include difficulties with memory, executive functioning (e.g., planning, attention and problem solving) and reasoning (Christman Buckingham, 2011, Nys et al., 2007). These difficulties may impact a person's ability to remember names and topics of conversation, provide appropriate responses in conversation, and understand humour and abstract information (American Speech-Language-Hearing Association, n.d.-d; Lehman Blake, 2019). Specific speech and language impairments associated with a right hemisphere stroke include: (a) reduced variation in pitch, volume, intonation and rhythm of speech; (b) difficulties expressing emotion; (c) poor pragmatic skills (e.g., reduced eye contact and turn taking); (d) difficulties understanding abstract language, jokes, and emotions of others; and (e) verbosity, tangential comments, and a focus on

irrelevant details (American Speech-Language-Hearing Association, n.d.-d; Blake et al., 2013; Lehman Blake, 2019).

In contrast, patients with communication disability secondary to left hemisphere stroke may have specific impairments of speech or language, notably *aphasia, dysarthria, apraxia of speech and/or cognitive communication disorder.* These are elaborated below.

**Aphasia**. Aphasia is defined as difficulties with spoken language expression, spoken language comprehension, written expression and reading comprehension (American Speech-Language-Hearing Association, n.d.-a). When speaking, people with aphasia often experience difficulty in thinking of words, may say the wrong word, or use made-up words. People with aphasia also may not understand what others are saying, and have difficulties with reading comprehension, spelling, maths, and handling money (American Speech-Language-Hearing Association, n.d.-a). As a result, people with aphasia can experience social isolation and negative impacts on their mood and quality of life (Hilari et al., 2012; Worrall et al., 2016).

**Dysarthria.** Dysarthria is defined as "abnormalities in the strength, speed, range, steadiness, tone or accuracy of movements required for breathing, phonatory, resonatory, articulatory or prosodic aspects of speech production" (Duffy, 2010, p. 4). The severity of dysarthria ranges from mild to moderate, severe, or profound and can impact on a person's ability to be clearly understood when speaking, voice quality and control of saliva. People with dysarthria may have speech that is slurred or mumbled; speak too slow or too fast, too loud, or too soft; and/or be perceived as sounding robotic, hoarse, or breathy (American Speech-Language-Hearing Association, n.d.-c). The social and psychological impact of dysarthria on a person can be significant: people with dysarthria often report having their intelligence or sobriety questioned as a result of

their speech quality and feel self-conscious due to difficulties with saliva control (Walshe & Miller, 2011).

**Apraxia of speech.** Apraxia of speech is defined as "an impaired capacity to plan or program sensorimotor commands necessary for directing movements that result in phonetically and prosodically normal speech" (Duffy, 2010, p. 4). Apraxia of speech often co-occurs with aphasia, limb or gait apraxia and swallowing apraxia. People with apraxia of speech often have difficulty saying sounds independently, add or leave out sounds in words and speak slowly (American Speech-Language-Hearing Association, n.d.-b). It is common for people with this condition to have difficulty speaking at a 'normal' rate, and they may place equal stress on each syllable, leading them to be perceived as having a robotic quality to their speech (American Speech-Language-Hearing Association, n.d.-b). Those with profound apraxia of speech may have difficulty producing any sounds. People with apraxia of speech may experience significant frustration during communication, particularly when they are able to say something correctly on some occasions and are unable to correct themselves when they mispronounce a word.

**Cognitive communication disorder.** Difficulties with verbal memory are commonly associated with left hemisphere stroke, contributing to cognitive communication disorders in this population (Ng et al., 2007; Weaver et al., 2021). This can lead to difficulties including retaining information, losing track of a conversation, reduced conversation topics, and confabulation.

Thus, people with communication disability resulting from stroke are a highly diverse population experiencing a wide range of functional impacts. Furthermore, this group often experience more than one type of communication disability (C. Mitchell et al., 2020; O'Halloran et al., 2009), and may have co-occurring cognitive impairments,

particularly in executive function (Sexton et al., 2019; Yao et al., 2020). Due to the interaction between language and cognitive function, it can be challenging to not only assess both language and cognition but also to understand their respective impacts on the person's communication function (Lee & Pyun, 2014; Yao et al., 2020). Accordingly, there is a need to reduce the clinical heterogeneity in order to interpret findings of the proposed research; including participants with a range of types and severity of communication disability, so as to understand any differences in experiences of falls. Hemispheric stroke location, classifiable by medical imaging, creates a definable opportunity for inclusion and exclusion criteria resulting in a narrower range of communication disability whilst still including a range of severity of functional impacts. Therefore, in this thesis, the focus is limited to those with acquired neurogenic communication impairments of speech and language as a consequence of stroke to the left hemisphere of the brain only.

**Patient Safety and Communication Disability in Hospital**

Communication disability following stroke can lead to barriers in effective communication with hospital staff (O'Halloran, Grohn, et al., 2012; Simmons-Mackie & Kagan, 2007) and adverse events in hospital (Hemsley et al., 2013, 2016a). Indeed, Bartlett et al., (2008) reported that hospital patients with communication disability were three times more likely to experience an adverse event than hospital patients without a communication disability. In an integrative review of the literature, Hemsley et al., (2016) described a range of adverse events for patients with communication disability in hospital; with the most common being falls, medication errors, development of pressure wounds, and choking on food. However, only limited research has evaluated strategies to improve safety and care for patients with communication disability in hospital (Hemsley & Balandin, 2014).

Falls in hospital patients with communication disability.

### *Falls in Hospital as a Patient Safety Incident*

A fall is defined as any event "which results in a person coming to rest inadvertently on the ground or floor or other lower level. Falls, trips, and slips can occur on one level or from a height" (World Health Organisation, 2021, p. 3). The rate of falls in hospital patients is typically measured per 1,000 bed days and varies across the globe, ranging from two to 16 falls per 1 000 bed days (LeLaurin & Shorr, 2019; Morris et al., 2022; Weerdesteyn et al., 2008). In Australian hospitals, falls account for 38% of documented adverse events and are one of the most common, harmful, and costly types of hospital patient safety incidents (A. M. Hill et al., 2010b; Morello et al., 2015; Oliver et al., 2010; Schwendimann et al., 2008). 'Near miss' falls, or falls which were forestalled, are also considered a patient safety incident and need to be documented to help identify factors leading up to and potentially preventing an actual fall (Lamb & Nagpal, 2009; Sheikhtaheri, 2014). By attending to and addressing such near miss falls, the underlying causes can be corrected (Lamb & Nagpal, 2009; Sheikhtaheri, 2014).

Potential adverse consequences of falls for patients in hospital include serious injury (rates range from 30-40%) and loss of functional capacity, confidence, and motivation to mobilise (Batchelor et al., 2012; Oliver et al., 2010; Weerdesteyn et al., 2008). Falls also lead to significantly increased length of stay and cost of care (Morello et al., 2015; Strilciuc et al., 2021). In Australia, patients who fall in hospital have on average an increased length of stay of eight days when compared to patients who do not fall, and a mean increased in cost of care of $6,669AU, (Morello et al., 2015) increasing if injuries are sustained from the fall (Morello et al., 2015).

### *Hospital Falls in Patients with Stroke*

Patients with stroke are at increased risk of falls, with a reported incidence between 14% and 65% during hospital admission (Batchelor et al., 2012; Denissen et

al., 2019; Morello et al., 2015; Stroke Foundation, 2018; Sullivan et al., 2020), which is considerably higher than the incidence of 3.6 - 7.5% for other hospital patients (Hill et al., 2010b; Oliver et al., 2010; Schwendimann et al., 2008). The risk factors for falls in this population are multifactoral, with the most commonly identified being balance impairments, increased dependence for activities of daily living tasks, hemi-neglect, and depression (Ashburn et al., 2008; Batchelor et al., 2012; Denissen et al., 2019; Weerdesteyn et al., 2008).

However, despite some evidence of increased risk for falls following stroke (Hemsley et al., 2019; Sullivan & Harding, 2019; Sze et al., 2001), and of significantly increased risk for multiple preventable and harmful patient safety incidents (Bartlett et al., 2008; Hemsley et al., 2013) there is relatively little research on patient safety in general, or falls in particular, that is inclusive of patients with communication disability. As a result, there is a significant gap in knowledge relating to strategies to help keep patients with stroke and associated communication disability safe in hospital, particularly in relation to falls. Further, there is a lack of evidence-based guidance on how an acquired communication disability contributes to falls in hospital, and on ways to reduce the risk of falls for this population whilst still progressing their rehabilitation.

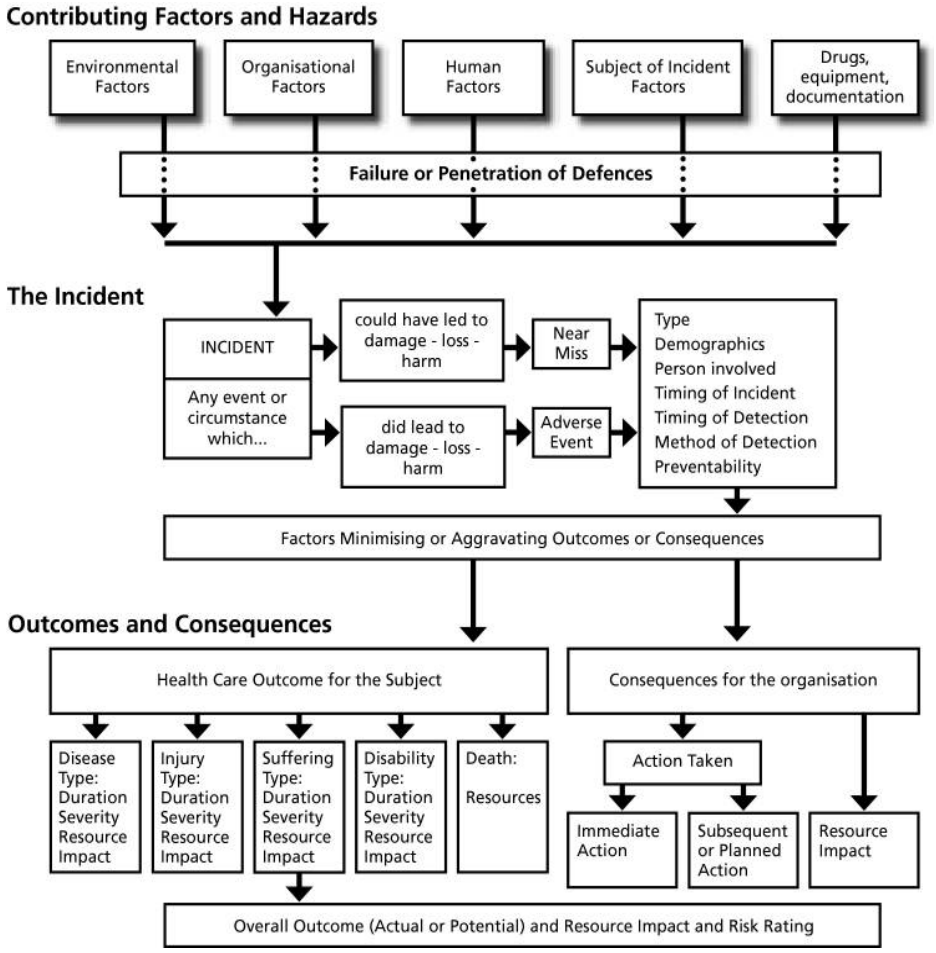
**Patient Safety in Hospital**

The World Health Organisation's International Classification for Patient Safety drafting group has defined patient safety as "the reduction in the risk of unnecessary harm associated with healthcare to an acceptable minimum" (W. B. Runciman et al., 2010, p. 1). Healthcare organisations face considerable challenges in improving the safety and quality of care provided to patients (W. B. Runciman et al., 2006). In 2004, the World Health Organisation launched the World Alliance for Patient Safety, with one of the key initiatives of the alliance being to develop an International Classification of

Patient Safety and a framework for the management of patient safety based on this classification (W. B. Runciman et al., 2006; Sherman et al., 2009). Patient safety frameworks provide structure to collecting and consolidating information about patient safety incidents and consider the interactions between elements of the incident including contributing factors and outcomes. In this context, patient safety was defined as "the reduction in the risk of unnecessary harm associated with healthcare to an acceptable minimum" (Runciman et al., 2010, p.1). A patient safety incident was defined as "an event or circumstance that could have resulted, or did result, in unnecessary harm to a patient. A patient safety incidence can be a reportable circumstance, a near miss, a no harm incidence or a harmful incident (adverse event)" (Runciman et al., 2009, p.19). The resulting Generic Reference Model (W. B. Runciman et al., 2006) is shown in Figure 1.

**Figure 1**

*The Generic Reference Model*




Reproduced from 'An integrated framework for safety, quality and risk management: An information and incident management system based on a universal patient safety classification', Runciman, W., Williamson, J., Deakin, A., Benvenisten, K., Bannon, K., & Hibbert, P. Volume 15(suppl.1), i82-i90. Copyright notice 2023 with permission from BMJ Publishing Group Ltd.

The model is underpinned by a risk management structure and outlines relationships between contributing factors, the patient safety incident and the outcomes and consequences for the patient and the organisation. Contributing factors and hazards for the incident are grouped into five categories: environmental factors; organisational factors; human factors; subject of incident factors; and drugs, equipment, and documentation. The incident is investigated in terms of the demographics of the person involved, timing of the incident, when and how the incident was detected, and

preventability of the incident. Outcomes and consequences are explored for both the person at the centre of the incident (i.e., the patient) and the organisation (e.g., the hospital) in relation to both the person's injury, suffering, and disability and in relation to any impact on resources. In this thesis, the model was used as a theoretically sound means of guiding collection of data, analysing and synthesising information about falls in hospital patients with communication disability following stroke.

**Aim and Significance of the Research**

The broad aim of this research was to examine the role of acquired communication disability in the falls of hospital patients with acquired communication disability secondary to left hemisphere stroke. Specifically, the body of work in this thesis aimed to: (a) explore the relationship between falls and communication disability in hospital patients with communication disability following stroke; (b) understand the existing strategies and policy settings to reduce falls risk among patients with communication disability; (c) identify the nature and context of falls for patients with communication disability following stroke; (d) identify the outcomes and impacts of hospital falls for patients with communication disability following stroke; and (e) identify potential strategies for reducing the risk of falls in patients with communication disability following stroke.

The findings will contribute to better understanding the wide range of factors influencing patient safety in relation to falls for adults with communication disability following stroke, specifically left hemisphere stroke, and will provide new knowledge in the application of the Generic Model of Patient Safety to falls in this population. Specifically, the research will generate original data on the fall risks, outcomes, and impacts of falls for patients with acquired communication disability secondary to left hemisphere stroke; and will inform the evaluation of existing and proposed strategies

for reducing the risk of falls for this population. The research questions addressed in this thesis, as well as the method, are described in Table 1 below.

**Table 1**

*Thesis Chapters, Research Objectives and Methods*

| Thesis Chapter | Chapter Title | Research Objective | Methods |
|---|---|---|---|
| 2 | Falls in hospital patients with acquired communication disability secondary to stroke: A systematic review and meta-analysis. | To determine the association between communication disability secondary to stroke and falls in people with stroke in hospital. | Narrative synthesis and meta-analysis |
| 3 | Circumstances and outcomes of falls in hospital for adults with communication disability secondary to stroke: A qualitative synthesis. | To determine the circumstances and outcomes of falls in hospitalised patients with communication disability following stroke. | Qualitative synthesis |
| 4 | Hospital Policies on Falls in Relation to Patients with Communication Disability: A Scoping Review and Content Analysis. | To determine how the content of hospital falls policies relate to patients with communication disability and to identify gaps in policy that need to be addressed. | Content thematic analysis. |
| 8 | Falls in patients with communication disability following stroke. | To examine and contextualise the falls of patients with communication disability following stroke in rehabilitation hospital, including the circumstances leading up to, and potentially contributing to the fall, the fall incident, and the outcome of the fall on both the patient and the rehabilitation hospital according to the Generic Reference Model (Runciman et al., 2006) | Descriptive data analysis of medical records and incident reports according to the Generic Reference Model (Runciman et al., 2006). |
| 9 | "Patient unable to express why he was on the floor, he has aphasia." A content thematic analysis of medical records and incident reports on the falls of hospital patients with | To examine the written texts contained in hospital medical records and incident reports on falls, for content relating to communication disability and communication strategies, to contribute to an in-depth understanding of ways to further understand | Content thematic analysis of medical records and incident reports |

| | | | |
|---|---|---|---|
| | communication disability following stroke. | and manage falls risk and prevention strategies for this vulnerable group. | |
| 10 | "We don't look too much into the communication disability" Clinician views and experiences on falls in hospital patients with communication disability following stroke. Page 166. | To explore the views of health professionals on: (a) the impact of communication disability on falls in patients with stroke; (b) falls prevention strategies for patients with communication disability following stroke, and (c) any potential role for speech pathologists in falls prevention and management for patients with communication disability following stroke | Content thematic analysis of health professional focus groups |
| 11 | "Communication disability plays a massive role." Clinical Implications and Recommendations for Management of Falls in Hospital Patients with Communication Disability After Stroke. Page 197. | To provide: (a) a synthesis of a set of recent integrated studies on falls in hospital patients with communication disability following stroke, and (b) guidance for health professionals to enhance falls prevention strategies for this group. | A qualitative meta-synthesis of six integrated studies using a content thematic analysis was conducted to identify themes across the studies |

## Chapter 2: Falls in Hospital Patients with Acquired Communication Disability Secondary to Stroke: A Systematic Review and Meta-analysis

Chapter 1 of this thesis introduced the topic of this research: the role of communication disability in the falls of hospital patients with communication disability following stroke. Communication disability has been identified as a risk factor for adverse events in hospital, but the association between communication disability as a potential risk factor for falls has not been carefully examined. Chapter 2 provides a systematic review that aims to explore the association between communication disability and falls in hospital patients with stroke. The protocol used to complete this review was a priori registered on PROSPERO (Appendix E):

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. A systematic review of falls in hospital patients with left hemisphere stroke and acquired communication disability secondary to stroke. PROSPERO 2019. CRD42019137199. https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019137199

This review was published in the International Journal of Language & Communication Disorders. The published version of the article can be found at:

Sullivan, R., Harding, K., Skinner, I., & Hemsley B. (2020) Falls in hospital patients with acquired communication disability secondary to stroke: A systematic review and meta-analysis. *International Journal of Language & Communication Disorders 55(*6), 837-851.https://doi.org/10.1111/1460-6984.12570. The content included in this chapter is identical to the manuscript accepted for publication. However, the formatting has been modified to match the format and style of the thesis, and the references have been consolidated into the reference list at the end of the thesis. The chapter is presented in manuscript form rather than its published format to comply

**PUBLISHED MANUSCRIPT STARTS HERE**

# Falls in hospital patients with acquired communication disability secondary to stroke: A systematic review and meta-analysis


## Abstract

### Background

Inpatient falls are a common safety incident in people with stroke. Studies report that between 14% and 65% of people with stroke fall at least once during their hospital admission. Risk factors for falls in people with stroke have been reported to include neglect, balance, and dependence for activities of daily living. Communication disability has been identified as a risk factor for adverse events in hospital but has not been closely examined as a potential risk factor for falls in people with stroke.

### Aim

To determine the association between communication disability secondary to stroke and falls in people with stroke in hospital.

### Method

Systematic searches of five electronic databases were conducted in June 2019, using the key concepts of "falls" and "stroke" (PROSPERO CRD 42019137199). Studies providing comparative data of falls in patients with stroke with and without communication disability were included. The methodological quality of the studies was examined using the Quality Assessment Tool for Studies with Diverse Designs (QATSDD). Both a narrative synthesis and meta-analysis were completed.

### Main contribution

Fifteen studies met criteria for inclusion, and 11 were included in a meta-analysis. Three studies found people with communication disability had an increased rate of falls in hospital, but a meta-analysis showed no significant association between a

non-specific classification of communication disability and an increased risk of falls. There was some indication from individual studies that higher risks may be associated with severe communication disability, but there was insufficient data reported on the severity of the communication disability to draw robust conclusions.

**Conclusion**

The results of this systematic review suggest that a non-specific classification of communication disability following stroke is not a risk factor for falls. However, further research that is inclusive of this population and considers severity of communication disability is required.

## What This Paper Adds

**What is already known on this subject.**

The association between communication disability following stroke and falls in hospital is unclear. The literature reports mixed results regarding the impact of a communication disability following stroke on falls risk or rates during hospital admission.

**What this study adds.**

This review is the first to bring together this diverse literature to specifically examine the association between communication disability following stroke and falls in hospital. The results suggest that a non-specific classification of communication disability following stroke is not a risk factor for falls.

**Clinical Implications of this study**

There is potential that moderate to severe communication disability may be related to falls in patients in hospital. Further research is indicated to be more inclusive of people with communication disability.

## Introduction

People with stroke are particularly at risk of falls during hospital admission. The Australian National Stroke Audit (Stroke Foundation, 2018) found that 15% of people with stroke fell during their inpatient rehabilitation admission, the most common "complication" (p. 38) during inpatient rehabilitation. Other literature reports between 14% and 65% of people with stroke fall at least once during their hospital admission (Batchelor et al., 2012; Walsh et al., 2016).

Falls in hospital potentially result in a number of adverse consequences to both the patient and the health service including injury, loss of functional capacity, confidence and motivation to mobilise as well as an increased length of stay and cost of care (Batchelor et al., 2012; K. D. Hill et al., 2007; Morello et al., 2015). The known risk factors for falls in people with stroke are multifactorial and include neglect, balance difficulties and dependence for activities of daily living (Batchelor et al., 2012; Campbell & Matthews, 2010).

There is a high prevalence of communication disability in people with stroke (O'Halloran et al., 2009). Communication disability, defined as "the impairments, activity limitations and participation restrictions that affect an individual's ability to interact and engage with the world in ways that are meaningful to them and those they communicate with" (The (Australian Bureau of Statistics, 2018; The University of Queensland, n.d.) is related to a range of conditions associated with stroke including aphasia, dysarthria, apraxia of speech and cognitive communication difficulties.

People with communication disability are known to have a three-fold increased risk for adverse events in hospital (Bartlett et al., 2008). Hemsley et al. (2019) conducted a comprehensive systematic review exploring the relationship between falls and communication disorders in hospital falls, including any study that included one or

more participants with conditions associated with communication disability. Despite there being an extensive body of literature on falls of patients with stroke (n=61 included studies), communication disability was included as a potential risk factor in 38 studies and received relatively little attention in reporting of results. Furthermore, where they were included, detail about the nature or extent of their communication impairments was often limited. This review was limited to a descriptive analysis but highlighted important issues in relation to inclusion of this population in falls research.

Attention to the falls risk of people with communication disability is of increasing concern in the literature (Hemsley et al., 2019), for several reasons. Those with communication disability following stroke are at a high risk of having activity limitations and participation restrictions in their communication with health professionals (Simmons-Mackie & Kagan, 2007). This limitation can impact a person's ability to understand and follow instructions required to safely transfer and stand, activities which occur repeatedly in day-to-day life. It may also impact a person's ability to communicate their needs, leading to risk-taking behaviour. Indeed Zdobysz et al. (2005, p. 70) suggested that falls during transferring (e.g., from sitting to standing) may result if "the patient does not understand or remember verbal instructions and recommendations regarding ambulation and physical activity." Indeed, Mion et al. (1989) and Nyberg and Gustafson (1995) reported a higher incidence of falls in patients who had an "…inability to understand or follow commands… regarding ambulation and transfer safety restrictions" (Teasell et al., 2002, p. 332).

Considering the urgent need to reduce the risk of patient safety incidents in hospital for people with communication disability, particularly falls (Hemsley et al., 2019), the aim of this review was to build on previous work and determine the association between communication disability secondary to stroke and falls in people

with stroke in hospital. This review focussed on papers that have published data directly comparing the risk of falls in patients with and without communication disability. This was done to both identify implications for the design of future falls research that is inclusive of adults with communication disability following stroke, and to inform policy and practice in relation to improving the care and safety of patients with stroke in hospital.

## Method

Reporting of this systematic review followed the PRISMA guidelines (Moher et al., 2009). The protocol for this review was registered apriori on PROSPERO (CRD 42019137199).

### Search Strategy

In July 2019, five databases (CINAHL, EMBASE, Medline, PsycINFO and Web of Science) were searched systematically for literature in English. There were no limits placed on date of publication. The search terms related to three key concepts of 'falls', 'hospital', and 'stroke'. Synonyms and permutations for each term were combined using the 'OR' and 'AND' operators (see Table 1). Google Scholar was used to locate forward and backward citations of studies which were screened to locate any additional studies potentially meeting the inclusion criteria. A search for potentially relevant titles by the first author of highly relevant articles was also conducted using Scopus and Google Scholar.

**Table 1**

*Search Strategy*

| Fall | Stroke | Hospital |
|---|---|---|
| Fall*<br>OR<br>Accidental falls | Cerebrovascular accident<br>OR<br>Cerebral haemorrhage<br>OR<br>Cerebral infarction<br>OR<br>Stroke | Hospital*<br>OR<br>Inpatient<br>OR<br>Ward<br>OR<br>Acute care<br>OR<br>Subacute Care<br>OR<br>Rehabilitation<br>OR<br>Hospital patient<br>OR<br>Patient |

Note: Search Strings
Fall* OR Accidental falls AND Hospital* OR inpatient OR ward OR acute care OR subacute care OR rehabilitation OR hospital patient OR patient AND cerebrovascular accident OR cerebral haemorrhage OR cerebral infarction OR stroke

**Eligibility Criteria**

To be included in the review, studies must have been a peer-reviewed full paper written in English, reported on original research, included adult participants (i.e., aged over 18 years) who had been admitted to acute or subacute hospital services following a stroke and included data on falls for patients with and without communication disability. Studies not peer-reviewed, not in English, not full papers (e.g., conference papers or posters) and not original research (i.e., systematic or other reviews, editorials) were excluded from the review.

**Study Selection**

All titles and abstracts were screened by two reviewers. Where papers met the criteria for inclusion, or if eligibility could not be determined from review of title and abstract, the full text was retrieved for further consideration. The criteria were applied to

full text articles by two reviewers (initials deidentified) independently, and any disagreement was resolved by a third reviewer (initials deidentified).

**Data Extraction**

Data from each study was extracted into an Excel database, enabling the analysis of features across studies. Data extracted related to (a) study setting, (b) design, (c) participant characteristics, (d) aim of the study, (e) exclusion criteria, (f) length of stay of participants, (g) incidence of falls, (h) details regarding the assessment, diagnosis and severity of communication disability, and (i) main findings for the primary outcome of falls incidence/rate for participants with and without communication disability.

**Quality Assessment**

The risk of bias of the included studies was assessed independently by the first and third authors using the Quality Assessment Tool for Studies with Diverse Designs (QATSDD) (Sirriyeh et al., 2011). Discrepancies regarding scores were resolved by consensus discussion. The QATSDD is a 16-item tool validated and applicable to research with heterogeneous study designs (Sirriyeh et al., 2011). It examines 14 items for quantitative and qualitative studies and 16 items for mixed methods studies with a maximum score of 42 for quantitative and qualitative studies and 46 for mixed methods studies. The items on the QATSDD examine theoretical framework, research aims, setting, sample size and representativeness, data collection process and rationale, appropriateness of data analysis, reliability and validity, user involvement and strengths and limitations. Studies are scored according to these aspects using a 4-point scale; 0 (not at all/not stated) to 3 (complete/explicitly stated) (Sirriyeh et al., 2011). In order to compare the quality of the included papers, a percentage of the maximum possible score was calculated, a higher percentage score suggests higher quality of the study or less bias. Additionally, in relation to the criteria “representative sample of target group of a

reasonable size" (p. 4), for cohort studies using regression analyses (accounting for the majority of studies) a rule of thumb of a minimum of 10 cases per variable was used (Peduzzi, 1996); typically, this meant a minimum sample size of n=150 participants was required to be considered reasonable.

**Analysis**

Data were initially analysed using descriptive synthesis and this was followed by a meta-analysis. The meta-analysis comparing the rate of falls in participants with and without communication disability in hospital was done using RevMan 5.3 software (The Cochrane Collaboration, 2014) with a random effects model for studies that reported falls incidence in participants with and without communication disability. In addition, two meta-analyses were conducted with two subgroups of more homogenous studies: (a) studies comparing the rate of falls in participants with and without aphasia rather than more general/mixed descriptions of communication disability, and (b) studies comparing the rate of falls in participants with communication disability, conducted in rehabilitation settings. $I^2$ was used to assess heterogeneity.

## Results

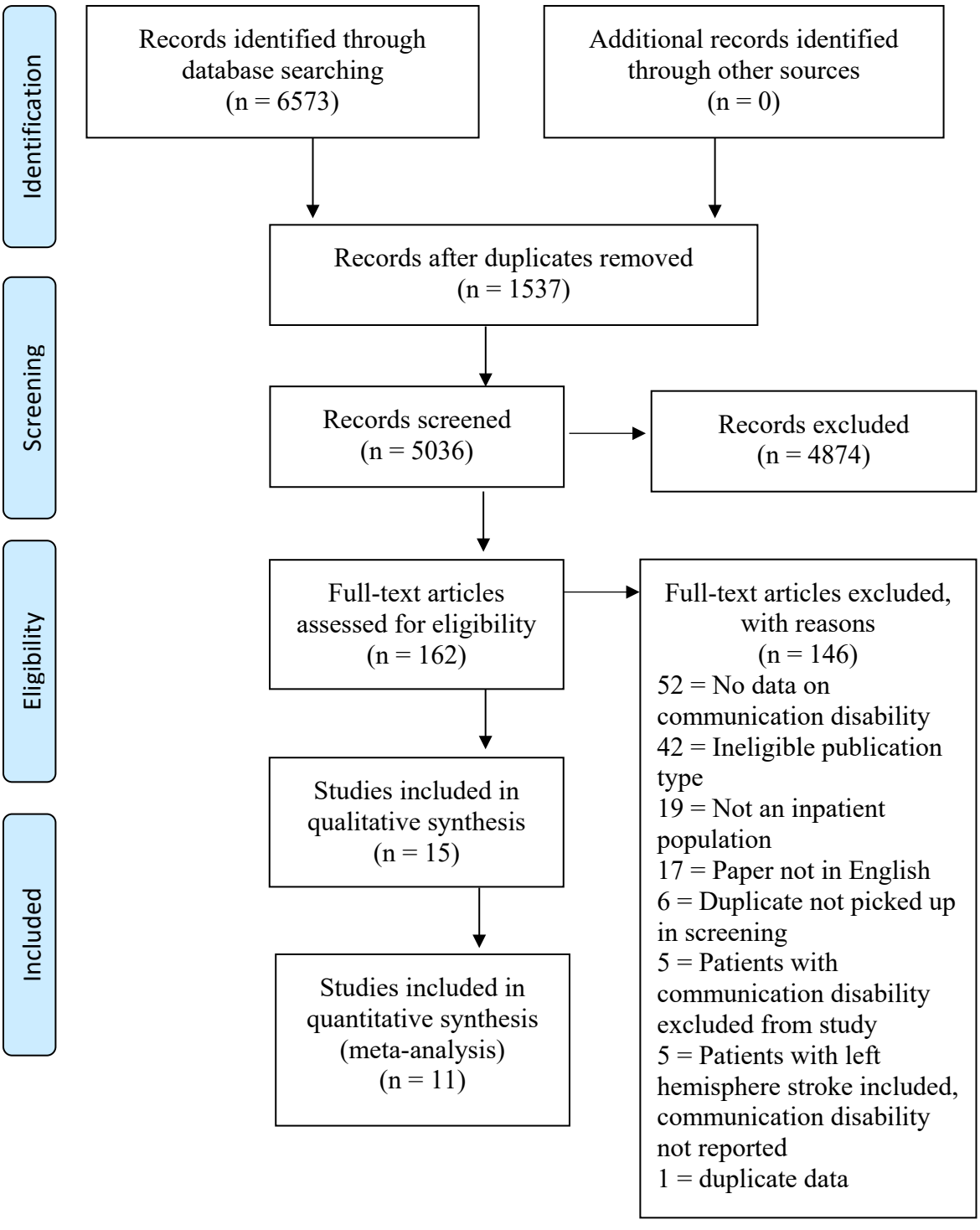
**Yield**

The initial search of electronic databases yielded 6573 individual studies, with 1537 duplicates which were removed. In total, 162 articles were retrieved as full texts for consideration against the inclusion criteria, yielding 16 studies for inclusion in the review. Forward and backward citation searches were completed, yielding no additional studies (see Figure 1). A full text review of two of the 16 papers required further discussion between the authors to reach consensus on inclusion or exclusion. These were two papers reporting on the same data set (Nyberg & Gustafson, 1996, 1997). The reviewers agreed to include only the 1997 paper, as both reported the same data relating

to communication disability, but the later paper included greater detail in reporting and analysis. Therefore, in total, 15 studies were included in the review.

**Figure 1**

*PRISMA Flowchart Documenting Search Results and Included Studies with Reasons for Exclusion.*



Falls in hospital patients with communication disability.

**Risk of bias**

The average risk of bias score across all included studies was 48.7%, ranging from 11.9% (Sinanovic et al., 2012) to 73.8% (Byers et al., 1990). Common quality issues across studies were not obtaining representative samples of the target population, lack of reporting of the size sample size calculation and lack of details in the description of the research setting and procedures for data collection. Only two studies (Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009) scored three for having a sample that was representative of the target group and of a reasonable size. A further 10 studies (Baetens et al., 2011; Bugdayci et al., 2011; Byers et al., 1990; Chaiwanichsiri et al., 2006; Nyberg & Gustafson, 1997; Sullivan & Harding, 2019; Sze et al., 2001; Teasell et al., 2002; Ullah et al., 2019; Zdobysz et al., 2005a) scored two due to smaller sample sizes or had samples that were not sufficiently representative of the target population. Exclusion criteria in these studies incorporated participants who were non-mobile or had no ambulation potential, or passed away (Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Nyberg & Gustafson, 1997; Teasell et al., 2002; Ullah et al., 2019). Only one study discussed the sample size required to reach statistical significance (Sullivan & Harding, 2019). A clear and thorough description of the research setting was given in five studies (Bugdayci et al., 2011; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1997; Sze et al., 2001), which scored three on this criterion. Thorough descriptions included the type of ward (i.e., acute, subacute or rehabilitation), average length of stay of participants, bed numbers and stroke onset to admission times for participants. Further to this, a thorough description of the procedure for data collection was detailed in four studies (Baetens et al., 2011; Byers et al., 1990; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009), thus scoring three on this criterion. The most common detail missing in the

remainder of the studies (Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Nyberg & Gustafson, 1997; Schmid, Wells, et al., 2010; Sinanovic et al., 2012; Sullivan & Harding, 2019; Sze et al., 2001; Teasell et al., 2002; Tsur & Segal, 2010; Ullah et al., 2019; Zdobysz et al., 2005a) was information about when data was collected in relation to the participants admission (i.e. first day of admission, within the first week). The variable quality across the remainder of the criteria for included studies is reported in Table 2.

**Table 2**

*Quality Assessment Results*

| **Study** | **Explicit theoretical framework** | **Statement of aims/objectives in main body of report** | **Clear description of research setting** | **Evidence of sample size considered in terms of analysis** | **Representative sample of target group of a reasonable size** | **Description of procedure for data collection** | **Rationale for choice of data collection tool** | **Detailed recruitment data** | **Statistical assessment of reliability and validity of measurement tools (Quant)** | **Fit between stated research question and method of data collection (Quant)** | **Fit between research question and method of analysis (Quant)** | **Good justification for analytic methods selected** | **Evidence of user involvement in design** | **Strengths and limitations critically discussed** | **Total (%)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baetens *et al.* (2011) | 3 | 3 | 2 | 0 | 2 | 3 | 1 | 2 | 0 | 3 | 3 | 1 | 0 | 3 | 26 (61.9) |
| Bugdayci *et al.* (2011) | 2 | 2 | 3 | 0 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 0 | 0 | 1 | 20 (47.6) |
| Byers *et al.* (1990) | 2 | 3 | 2 | 0 | 2 | 3 | 1 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 31 (73.8) |
| Chaiwanichsiri *et al.* (2006) | 1 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 14 (33.3) |
| Czernuszenko (2007) | 3 | 3 | 3 | 0 | 3 | 3 | 0 | 2 | 0 | 2 | 1 | 0 | 0 | 3 | 23 (54.8) |
| Czernuszenko (2009) | 3 | 3 | 3 | 0 | 3 | 3 | 0 | 3 | 0 | 2 | 3 | 1 | 0 | 2 | 26 (61.9) |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nyberg & Gustafson (1997) | 2 | 3 | 3 | 0 | 2 | 2 | 0 | 3 | 0 | 3 | 2 | 0 | 0 | 2 | 22 (52.4) |
| Schmid *et al.* (2010) | 2 | 3 | 2 | 0 | 1 | 2 | 2 | 1 | 0 | 2 | 2 | 0 | 0 | 3 | 20 (47.1) |
| Sinanovic *et al.* (2012) | 0 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 (11.9) |
| Sullivan & Harding (2019) | 3 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | 0 | 2 | 3 | 3 | 0 | 3 | 27 (64.3) |
| Sze *et al.* (2001) | 3 | 3 | 3 | 0 | 2 | 2 | 2 | 3 | 1 | 2 | 2 | 0 | 0 | 1 | 24 (57.1) |
| Teasell *et al.* (2002) | 3 | 3 | 2 | 0 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 0 | 0 | 2 | 22 (52.4) |
| Tsur & Segal (2010) | 2 | 3 | 2 | 0 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 13 (31.0) |
| Ullah *et al.* (2019) | 2 | 3 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 12 (28.6) |
| Zdobysz *et al.* (2005) | 3 | 3 | 1 | 0 | 2 | 2 | 3 | 2 | 1 | 3 | 2 | 0 | 0 | 0 | 22 (52.4) |

Falls in hospital patients with communication disability.

**Research Designs**

All included studies were either cohort or case control designs, with seven being prospective (Baetens et al., 2011; Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1997; Zdobysz et al., 2005a) and the remainder (n=8) retrospective (Table 3). In total, there were 6935 participants across the included studies. The smallest sample size in an individual study was a study that included 41 participants who had fallen (Tsur & Segal, 2010). The largest sample size was in Sinanovic *et al.* (2012) being 1809 participants admitted to an acute hospital setting over a 1-year time period. Overall, the average age of participants across 12 of the studies was 66.8 years. Two studies (Sze et al., 2001; Zdobysz et al., 2005a) dichotomised age of their participants as under 65 years or over 65 years of age and one study (Sinanovic et al., 2012) did not report the age of participants.

In 12 of the 15 included studies, participants were admitted to an inpatient rehabilitation unit (Baetens et al., 2011; Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1997; Sullivan & Harding, 2019; Sze et al., 2001; Teasell et al., 2002; Tsur & Segal, 2010; Ullah et al., 2019; Zdobysz et al., 2005a). In two studies (Schmid, Wells, et al., 2010; Sinanovic et al., 2012) participants were admitted to an acute hospital, and in one study (Byers et al., 1990) the type of hospital setting was not specified. The length of stay for participants was reported in 10 of the 15 studies (Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Schmid, Wells, et al., 2010; Sinanovic et al., 2012; Sullivan & Harding, 2019; Sze et al., 2001; Ullah et al., 2019; Zdobysz et al., 2005a), with an average of 30.4 days.

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**Study participants**

All of the included studies involved participants with clinical or neuroimaging evidence of stroke and at least one participant who was reported to have communication disability. Six studies excluded patients with severe strokes and participants who were non-mobile (Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Nyberg & Gustafson, 1997; Schmid, Wells, et al., 2010; Sze et al., 2001; Teasell et al., 2002). Additional exclusion criteria applied in studies that included participants with concurrent neurological disorders (Baetens et al., 2011; Bugdayci et al., 2011), cognitive difficulties (Baetens et al., 2011; Chaiwanichsiri et al., 2006), and participants who did not complete rehabilitation due to transfer or death (Ullah et al., 2019; Zdobysz et al., 2005a). Bugdayci et al. (2011), despite reporting aphasia as a co-morbidity, excluded participants who were "unable to communicate" (p. e216), and Baetens et al. (2011) reported participants "had to be able to understand the meaning of the study and to follow instructions" (p. 877).

**Table 3**

*Summary of Study Characteristics*

| **Authors, country, setting** | **Method** | **Participants** | **Study Aim** | **Independent Variable** | **Dependent variable** | **Assessment of communication disability** | **Severity of communication disability** | **Key Findings** |
|---|---|---|---|---|---|---|---|---|
| Baetens *et al.* (2011) Belgium Rehabilitation | Prospective cohort study | N =73<br>Age = 64.6 ± 15.0<br>Male = 60% | Assess risk factors for falls | Fallers vs non fallers | Aphasia (prevalence 16.9%) | Not reported | Not reported | No difference in falls between patients with/without aphasia p=0.34 |
| Bugdayci *et al.* (2011) Turkey Rehabilitation | Prospective cohort study | N = 99<br>Age = 61.99 ± 11.79<br>Male = 42.4% | Determine the frequency, features, and factors affecting falls | Fallers vs non fallers | Aphasia (prevalence 9.8%) | Not reported | Not reported | No difference in falls between patients with/without aphasia p=0.05 |
| Byers *et al.* (1990) USA Hospital | Retrospective case control study | N = 313<br>Age<br>Fallers = 66.0 ± 14.8<br>Non-fallers = 69.3 ± 13.8<br>Male = 56.5% | Assess risk factors for falls | Fallers vs non fallers | Dysarthria<br>Difficulty speaking<br>Cannot follow commands<br>Slurred speech | Communication disability as reported through documentation or clinical observation. Combined with mental status variables. | Not reported | The fall group had less difficult speaking and less dysarthria |
| Chaiwanichsiri *et al. (2006)* Thailand | Prospective cohort study | N = 151<br>Age: *Fallers* = 63.8 ± 10.8 | Determine risk factors and | Fallers vs non fallers | Aphasia | Not reported | Not reported | No difference in falls between patients |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rehabilitation | | *Non-fallers = 62.1* ± 11.5<br>Male = 56.9% | incidence of falls | | | | | with/without aphasia p=0.78 |
| Czernuszenko (2007)<br>Poland<br>Rehabilitation | Prospective cohort study | N = 353<br>Age = 62 ± 14<br>Male =56.4% | Assess the incidence, circumstances and sequelae of falls and verify the risk factors for falls | Fallers vs non fallers | Aphasia (prevalence 38.8%) | Communication disability assessed using Scandinavian Stroke Scale | Not reported | No difference in falls between patients with/without aphasia p=0.58 |
| Czernuszenko & Czlonkowska (2009)<br>Poland<br>Rehabilitation | Prospective cohort study | N = 1155<br>Age = 61.5 ± 14.3<br>Male = 56.5% | Assess the incidence, circumstances and outcomes of falls | Fallers vs non fallers<br>Falls incidence | Aphasia (prevalence 38%) | Communication disability assessed using Scandinavian Stroke Scale | Not reported | No difference in falls between patients with/without aphasia for first falls or repeated falls<br>p=0.567 (first fall)<br>p=0.997 (repeated falls) |
| Nyberg (1997)<br>Sweden<br>Rehabilitation | Prospective cohort study | N = 142<br>Age = 74.8 ± 8.9<br>Male = 51.1% | Develop a fall risk assessment tool | Fallers vs non fallers | Aphasia (prevalence 25.7%) | Admission assessment and observation then consensus rated in team meetings | Not reported | No difference in falls between patients with/without aphasia OR 1.36 (0.77-2.41) |
| Schmid *et al.* (2010)<br>USA<br>Acute Hospital | Prospective cohort study | N = 1269<br>Age = 71.21 ± 13.3<br>Male = 56% | Identify risk factors and prevalence of falls | Fallers vs non fallers | Aphasia (prevalence 35%) | Reported as either absent or present | Not reported | No difference in falls between patients |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | with/without aphasia p=0.83 |
| Sinanovic *et al.* (2012) Bosnia and Herzegovina Acute Hospital | Retrospective cohort study | N = 1809 Age = not reported Male = 55.7% | Analyse the incidence and characteristics of falls | Fallers vs non fallers | Aphasia (prevalence 77.05%) | Not reported. | Not reported | Significant relationship between aphasia and falls p=<0.001 |
| Sullivan & Harding (2019) Australia Rehabilitation | Retrospective cohort study | N = 149 Age = 75.8 Male = 57% | Determine if there is an association between the incidence of falls and severe communication impairment | Fallers vs non fallers | Functional communication in ward environment | Ability to communicate basic needs (yes/no) determined by speech pathologist assessment (incorporating aphasia, dysarthria, apraxia of speech and cognitive communication) | Severity of communication disability determined by speech pathology assessment. | Patients without functional communication at a higher risk of falls OR = 0.38 (0.17 – 0.86) |
| Sze *et al.* (2001) China Rehabilitation | Retrospective cohort study | N = 727 Age = dichotomised to under 65 and over 65 Male = 53.3% | Investigate the incidence, risk factors and circumstances for falls | Fallers vs non fallers | Aphasia (expressive, receptive, and global) | Not reported | Not reported | The presence of dysphasia was a risk factor for falls (p=0.0383) particularly expressive dysphasia (p=0.0228) |
| Teasell *et al.* (2002) | Retrospective cohort study | N = 238 | Determine the incidence, risk | Fallers vs non fallers | Aphasia (expressive, | Identified and recorded as part | Not reported | No difference in falls between |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Canada Rehabilitation | | Age = 72.7 ± 10.1 Male = 49.8% | factors and outcomes of falls | | conductive, and global) | of usual clinical practice. Dichotomised as present or absent | | patients with/without aphasia p=0.65 |
| Tsur & Segal (2010) Israel Rehabilitation | Retrospective observational study | N = 41 Age = 67 ± 8.9 Male = not reported | Assess the risk factors for falls | Descriptive data from a sample of patients who fell | Communication disability (different types of aphasia) (prevalence 29%) | Tested and recorded by a specialist physician | Not reported | Communication disability reported to be a factor in 29% of falls |
| Ullah *et al.* (2019) Saudi Arabia | Retrospective cohort study | N = 146 Age = 59.9 ± 13.16 Male = 65.8% | Determine the incidence and risk factors of falls | Fallers vs non fallers | Communication disability | Not reported | Not reported | No difference in falls between patients with/without aphasia p=0.56 |
| Zdobysz *et al.* (2005) USA Rehabilitation | Prospective cohort study | N = 1014 Age = 54% over 65 Male = 47.5% | Determine risk factors for falls and examine any relationship with AFIM | Fallers vs non fallers | Not reported | Communication scores of participants were measured as part of the FIM but not tested statistically. | Not reported. | Association between falls and communication disability was not tested |

Falls in hospital patients with communication disability.

## Communication Disability

### *Type of Communication Disability Reported*

Aphasia was the most common type of communication disability in participants, reported in 11 studies (Baetens et al., 2011; Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1997; Schmid, Wells, et al., 2010; Sinanovic et al., 2012; Sze et al., 2001; Teasell et al., 2002; Tsur & Segal, 2010). Nyberg & Gustafson (1997) and Teasell et al. (2002) discussed both aphasia and dyspraxic behaviour or apraxia. While apraxia of speech is considered a specific form of communication disability following stroke, neither of these studies provided sufficient information regarding the type of dyspraxia (e.g., limb, speech) to be considered a communication disability for this review. Byers et al. (1990) reported on four communication disability variables: dysarthria, difficulty speaking, cannot follow commands, and slurred speech. However, due to these not being mutually exclusive categories (e.g., difficulty speaking could include slurred speech and dysarthria; dysarthria is another term for slurred speech) only the variable "difficulty speaking" was considered for analysis in this review. One study (Zdobysz et al., 2005a) reported communication disability only as a component of the FIM.

### *Assessment and Severity of Communication Disability*

Nine of the 15 studies included information on the diagnosis or assessment of communication disability. Of these, three studies reported measures of diagnosis of communication disability according to speech pathology assessment (Sullivan & Harding, 2019; Sze et al., 2001; Teasell et al., 2002), and a further three according to either clinical observation (Byers et al., 1990; Nyberg & Gustafson, 1997), or specialist physician report (Tsur & Segal, 2010). The remaining three studies reported diagnosis of communication disability by a standardised assessment tool, namely the

Scandanavian Stroke Scale (Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009) and the FIM (Zdobysz et al., 2005a). Sullivan and Harding (2019) was the only study to report on the severity of communication disability and discuss how the severity of communication disability was diagnosed. No single measure was used across all of the studies, preventing any possibility of comparing the studies according to severity of the person's communication disability.

***Prevalence of communication disability***

A total of 10 of the 15 included studies reported the percentage of participants with communication disability (Baetens et al., 2011; Bugdayci et al., 2011; Byers et al., 1990; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1997; Schmid, Wells, et al., 2010; Sinanovic et al., 2012; Sullivan & Harding, 2019; Ullah et al., 2019). Rates of communication disability across these studies were variable, the average 33.57% and range being 9.8% (Bugdayci et al., 2011) to 68% (Sullivan & Harding, 2019).

***Adaptations to study due to Communication Disability***

Three studies reported adapting methodology to better accommodate or describe participants with communication disability (Baetens et al., 2011; Nyberg & Gustafson, 1997; Sze et al., 2001). To illustrate, Baetens et al. (2011) held structured interviews where data relating to patients with communication disability were collected from either participants or families (p. 877); and reported registering, but not excluding, participants with aphasia when they were unable to complete a part of the testing protocol. In the Nyberg and Gustafson study (1997), a Line Bisection Test was used to evaluate the presence of neglect. If participants with aphasia could not complete, performance was estimated through multidisciplinary rehabilitation team consensus after admission assessments and observations of behaviour. Also, Sze et al. (2001) modified the scoring

on The Abbreviated Mental Test (used to screen cognitive impairment in participants) to accommodate participants who failed due to aphasia. Despite their key role in working with patients with communication disability, speech pathologists were only reported to be involved in the research or data collection procedures in three of the studies (Sullivan & Harding, 2019; Sze et al., 2001; Teasell et al., 2002). Overall, there was little indication across the studies that methods had been adapted to include participants with severe communication disability.

**Measurement of Falls**

The definition of a fall was provided in 10 studies (Baetens et al., 2011; Bugdayci et al., 2011; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1997; Sinanovic et al., 2012; Sullivan & Harding, 2019; Sze et al., 2001; Tsur & Segal, 2010; Ullah et al., 2019; Zdobysz et al., 2005a) with all defining and 'unexpected' event where the patient 'came to rest on the ground or lower level'. Furthermore, the majority of studies ascertained a fall event through medical record or incident report (Byers et al., 1990; Chaiwanichsiri et al., 2006; Schmid, Wells, et al., 2010; Sullivan & Harding, 2019; Sze et al., 2001; Teasell et al., 2002; Tsur & Segal, 2010; Zdobysz et al., 2005a) or reports from staff, patients or witnesses (Baetens et al., 2011; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1997). The proportion of patients who fell varied from 3.3% (Sinanovic et al., 2012) to 64.5% (Byers et al., 1990), and the incidence of falls was reported in 13 studies. Tsur and Segal (2010) only reported the characteristics of participants who fell (i.e., not those who did not fall), and Zdobysz *et al.* (2005) only reported falls rates for the first five days of admission. Six of the studies reported proportion of falls in participants with communication disability (Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Sinanovic et al., 2012;

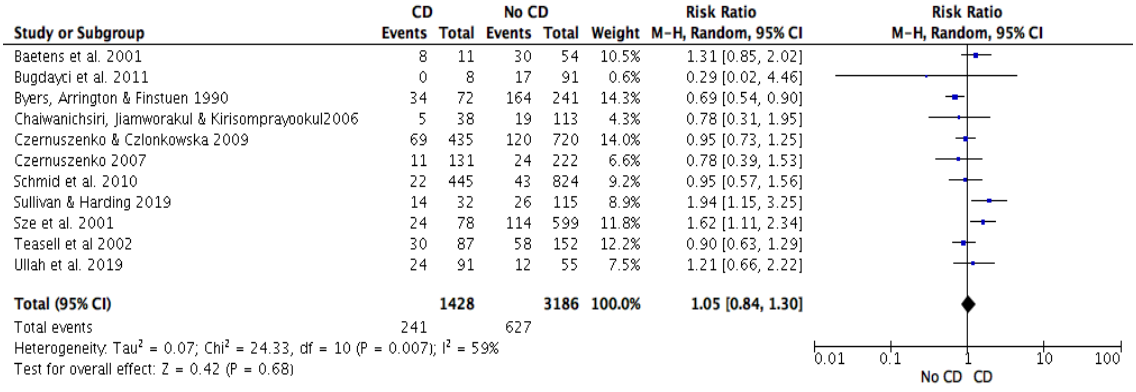
Sullivan & Harding, 2019; Teasell et al., 2002; Ullah et al., 2019) with significant variability, ranging from 34.5% in Teasell et al. (2002) to 66.7% in Ullah et al. (2019).

**Relationship between Falls and Communication Disability**

A meta-analysis was conducted with 11 included studies that provided sufficient detail of reporting to extract homogenous data. This meta-analysis showed no statistically significant association between participants with communication disability secondary to stroke and risk of falls in hospital (see Figure 2), risk ratio (RR) 1.06; 95% confidence interval (CI) 0.86, 1.32; P=0.57. A significant association between falls and participants with communication disability following stroke is apparent in two studies (Sullivan & Harding, 2019; Sze et al., 2001), with both studies finding higher falls rates in participants with communication disability following stroke; RR 1.94; CI 1.15, 3.25 and RR; 1.62 CI 1.11, 2.34 respectively. Diverging from this, Byers et al. (1990) found that participants with communication disability were less likely to fall (RR 0.69; CI 0.54, 0.90) than other participants. Figure 2 shows that the remaining studies cross the line of null effect. The heterogeneity between these studies was $I^2 = 59\%$.

**Figure 2**

*Meta-analysis of Studies Reporting the Difference Between Total Number of Falls Experienced by Participants With and Without Communication Disability*



One additional study (Sinanovic et al., 2012) also found higher rates in falls among people with a communication disability ($p<0.01$) but was not included in the meta-analysis due to insufficient detail in the reporting of the incidence of falls in people with and without communication disability. These three studies that found an association between people with a communication disability and rates of falls in hospital (Sinanovic et al., 2012; Sullivan & Harding, 2019; Sze et al., 2001), included participants with a range of stroke types and had a stronger focus on communication disability. Sullivan & Harding (2019) included four types of communication disability, aphasia, dysarthria, apraxia of speech, and cognitive communication disability.

Given the relatively high level of heterogeneity in the meta-analysis (Higgins et al., 2019), two additional meta-analyses were completed to explore the relationship between falls and communication disability in studies that were expected to have higher levels of homogeneity: (a) studies conducted in rehabilitation settings (n=9), and (b) studies comparing participants with and without aphasia, rather than comparing participants in studies with non-specific descriptions of communication disability (n=8) (Figure 3). There was no statistical significance between the presence of aphasia and the risk of falls for patients with stroke in hospital, RR 1.03; CI 0.88, 1.21; P=0.74. Only one study showed a significant association between aphasia and falls (Sze et al., 2001), with a higher risk of falls in participants with aphasia following stroke (RR 1.62; CI 1.11, 2.34). The remaining studies crossed the line of null effect. The heterogeneity between these studies was $I^2 = 24\%$. Similarly, there was no statistically significant association between the presence of communication disability and the risk of falls in rehabilitation settings (RR 1.17; CI 0.96, 1.45; P=0.14). The heterogeneity was $I^2= 39\%$ between these studies.

Falls in hospital patients with communication disability.

**Figure 3**

*Meta-analysis of Studies Reporting the Difference Between the Total Number of Falls Experienced by Participants With and Without Aphasia.*

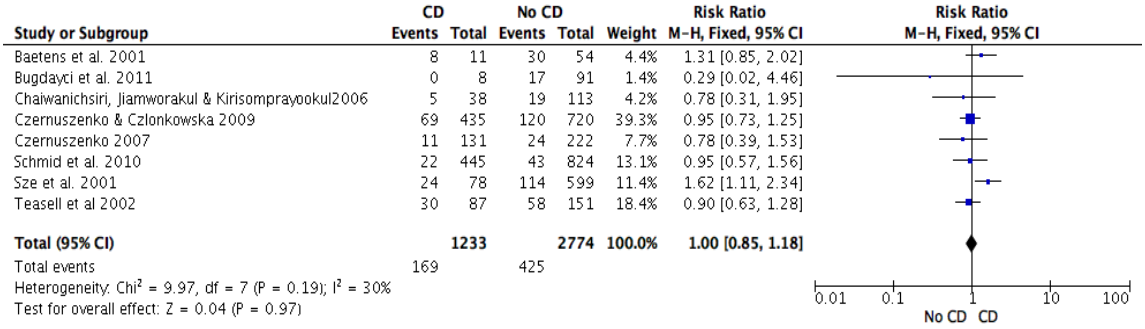
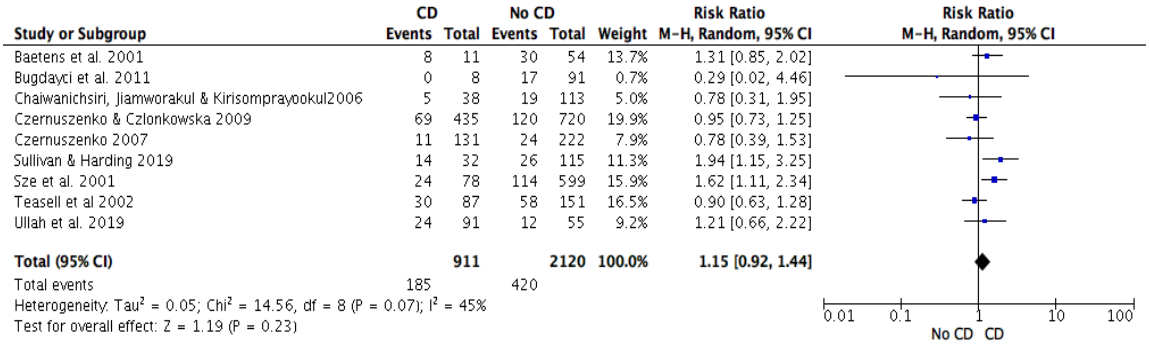



**Figure 4**

*Meta-analysis of Studies Reporting the Difference Between the Total Number of Falls Experienced by Participants with Communication Disability in a Rehabilitation Setting.*




## Discussion

This review is the first to bring together this diverse literature to specifically examine the association between communication disability following stroke and falls in hospital. The results suggest that a non-specific classification of communication disability following stroke is not a risk factor for falls. However, this result should be interpreted with caution considering the design aspects of the studies meant an under-representation of patients with more severe communication disability through application of exclusion criteria or the requirement for functional communication to participate in the research.

Previous reviews investigating the falls of people with stroke in hospital have examined the evidence for risk factors for falls following stroke, risk prediction models, and falls prevention strategies (Batchelor et al., 2012; Campbell & Matthews, 2010; Walsh et al., 2016). Falls in people with stroke in hospital are multifactorial with risk factors including balance impairments (Forster & Young, 1995; Rabadi et al., 2008; Teasell et al., 2002), dependence for activities of daily living (Forster & Young, 1995; Suzuki et al., 2005; Sze et al., 2001; Teasell et al., 2002), hemineglect (Czernuszenko, 2007; Nyberg & Gustafson, 1995), and cognitive deficits (Byers et al., 1990; Lee & Stokic, 2008; Rabadi et al., 2008; Tutuarima et al., 1997). The inclusion of communication disability as a variable in these studies has been inconsistent, and findings have been mixed.

Evidence from the literature identified in this review is limited by a lack of reporting on severity of communication disability. The assessment and diagnosis of communication disability in studies about falls in patients with stroke lacks consistency across studies, limiting comparison according to severity of the person's communication disability. For example, while three studies used standardised assessment tools to diagnose communication disability, these tools were not validated assessments of communication disability specifically and varied across studies. Given that admission stroke impairment scales are typically limited in terms of measuring communication functions, and do not identify the functional implications of stroke in terms of a patient's ability to communicate with hospital staff, the inclusion of speech pathologists in falls research teams is expected to yield further insights into falls for patients with stroke (Hemsley et al., 2019).

Only one study reported on the association between falls and patients with severe communication disability, defined as the inability to meet basic needs in the

hospital ward environment. This study was one of four that found that there was a higher risk of falls in this population. This could suggest that the presence of a mild to moderate communication disability may not increase the risk of falls in patients with stroke, and furthermore explain the lack of any association in the majority of studies. The exclusion of participants with severe stroke may have resulted in some under-representation of patients with severe communication disability, given only 1% of patients survive a severe stroke with intact communication (C.Mitchell et al., 2020). This exclusion criteria may have resulted in a selection bias for participants with mild to moderate communication disability, which may mean that research to date does not adequately answer the question of whether there is an association between falls and people with communication disability following stroke.

Communication disability following stroke has a range of functional implications for people in hospital. Whilst mild communication disability can impact greatly on a person's function, the severity of communication disability might be an important and as yet under-researched factor in falls in this group. A person with mild communication disability might have a greater ability to understand instructions and express their needs, potentially providing some protection against risk of falls. Conversely, a person with severe communication disability might have more difficulty than others in in comprehending instructions required to undertake a safe transfer, use a gait aid safely, or communicate their needs relating to mobility or toileting (i.e., motivations to walk unassisted, with some risk). Additionally, in the absence of an individually tailored and modified education program, a person with severe communication disability is not likely to comprehend educational interventions designed to mitigate the risk of falls, and therefore may undertake behaviours that increase their risk of falls. It is important to examine the context and nature of falls for

patients with and without communication disability secondary to stroke, to compare the needs of these two populations and identify any specific or additional falls prevention approaches needed to meet the needs of patients with communication disability. Without research including this population, it is not possible to know whether or not these reasonable assumptions are borne out in relation to the association of falls with communication disability.

A further limitation of the literature to date is the variability of inclusion and participation of patients with communication disability in study samples. In this review, the heterogeneity in the included studies, particularly in the clinical diversity in participants, indicates that people with communication disability have varied inclusion and participation across the studies. In people with stroke, the prevalence of communication disability has been estimated at up to 88% (O'Halloran et al., 2009). However, the rate of reported communication disability in the included studies was as low as 9.8% (Bugdayci et al., 2011). Two of the included studies (Baetens et al., 2011; Bugdayci et al., 2011) specifically excluded participants with severe communication disability, but participants with aphasia were included in their results indicating these participants were likely able to communicate to some extent. The adaptations made in three studies to accommodate people with communication disability were to ensure reliable scoring of other physical or cognitive measures of falls risk, rather than to facilitate a greater inclusion of people with communication disability.

The two-sub group meta-analyses that were completed both reduced the heterogeneity but neither showed significant association between communication disability and falls rates. The studies included in these meta-analyses likely included participants with varying degrees of severity of communication disability which is likely to be a more important consideration in falls risk than setting or specific type of

communication disability. There was not enough detail in the studies to be able to examine the impact of severity of communication disability on falls risk further. This association should be the focus of further research.

One of the strengths of this review is the meta-analysis allowing pooled data from studies to estimate the common effect from 5214 participants, a large sample size. The inclusion of communication disability following stroke as a risk factor for falls has primarily been studied as a single factor included within regression analyses among multiple other variables. The results of these studies have reported mixed findings in relation to the impact of communication disability as a risk factor for falls. This meta-analysis provides the combined effects of the studies showing that there does not appear to be a clear association between a non-specific diagnosis of communication disability and falls, regardless of severity. However, because of limitations in measurement and reporting of severity of communication disability and the exclusion of people with more severe disability from some of the studies, there is likely to be value in further research determining if there is an increased risk of falls in people with severe communication disability and if so, how this risk may be mitigated.

The results of this review show that falls risk research has included some populations with communication disability. However, the quality of the included studies should be taken into account when interpreting the findings of this review. Several of the studies reviewed actively excluded participants with severe strokes or those that were not mobile, thereby also indirectly excluding participants with more severe communication disabilities. People with severe stroke are likely to have the most risk factors for falls (e.g., because of a high dependence for activities of daily living, poor balance and hemineglect) and there is evidence that stroke severity is a risk factor for falls (Rabadi et al., 2008; Schmid, Wells, et al., 2010; Sze et al., 2001). Additionally,

people with stroke often experience falls from bed (Bugdayci et al., 2011; Czernuszenko & Czlonkowska, 2009; Lee & Stokic, 2008; Tutuarima et al., 1997; Zdobysz et al., 2005a). The majority of studies in this review were in a rehabilitation setting and it is likely that people with stroke who are not mobile would be participating in therapeutic interventions such as sitting balance retraining and transfer practice as part of their rehabilitation program. These activities are often associated with falls in people with stroke in hospital and the exclusion of these participants potentially obscures important information regarding falls in people with stroke in hospital.

**Clinical Implications for Speech-Language Pathologists**

Falls prevention strategies are multifactorial and involve strategies such as verbal and written education, behaviour modifications, environmental adaptations, and external devices (e.g., bed/chair alarms) and beds being lowered to the floor (Cameron et al., 2012; A.-M. Hill et al., 2015). Addressing the risk of falls in people with severe communication disability can be challenging for both clinicians and health services given the reliance on effective communication skills to modify falls risk factors. However, these challenges might be overcome at least in part by the inclusion of speech-language pathologists to support effective communication. Adaption to written and verbal education materials to include aphasia friendly material might also help to ensure that people with severe communication disability are educated regarding their risk of a fall and the prevention measures they can take (Sullivan & Harding, 2019). Additionally, the presence of speech-language pathologists in therapeutic interventions involving falls-prevention activities (e.g., safe transfers, use of mobility aids) might further empower people with severe communication disability to modify their risk factors for falls.

**Conclusion**

This systematic review of 15 studies, including adults with a range of communication disabilities following stroke, suggests that there is no association between unspecified communication disability following stroke and risk of falls in hospital. However, the limitations of the studies reviewed also mean that the results of this review should be interpreted with caution. Variability in the nature of communication disability, combined with lack of control over several design elements related to communication (e.g., non-specific measures, lack of a validated diagnostic instrument, no measure of severity of impairments), all mean that further research is indicated to address these limitations and provide greater certainty about any association between communication disability and falls. Further research in falls should focus on inclusion of people with severe communication disability following stroke.

Falls in hospital patients with communication disability.

## Chapter 3: Circumstances and Outcomes of Falls in Hospital for Adults with Communication Disability Secondary to Stroke: A Qualitative Synthesis

The systematic review and meta-analysis described in Chapter 2, did not find a significant association between communication disability (as a non-specific category) and an increased risk of falls in hospital. However, the research was limited by scant reporting on the severity of communication disability and the exclusion of people with severe strokes, a population who are highly likely to have communication disability. The three studies that did include participants with severe communication disability found an association between communication disability and falls in hospital and suggested that patients with difficulties communicating their basic needs may take risks (e.g., mobilising alone when not indicated), and have difficulties following the instructions required for safe transfers resulting in a fall. However, there is little information regarding the needs of patients with communication disability in relation to falls in hospital and the contributing factors, hazards and outcomes of their falls is unknown. Understanding these circumstances could provide useful information to identify appropriate falls prevention strategies and reduce the risk or incidence of falls.

This qualitative synthesis was conducted as a secondary analysis of the papers identified in the systematic review reported in Chapter 2. Data were extracted to examine whether these papers described any circumstances or outcomes of falls in hospital patients with communication disability.

This secondary analysis of a systematic review was published in Advances in Communication and Swallowing as:

Sullivan, R., Skinner, I., Harding, K., & Hemsley, B, (2022). Circumstances and outcomes of falls in hospital for adults with communication disability secondary to

stroke: A qualitative synthesis. *Advances in Communication and Swallowing*, 24: 99-110 http://dx.doi.org/10.3233/ACS-210028

The content included in this chapter is identical to the accepted and published manuscript. However, the formatting has been modified to match the format and style of the thesis, and the references have been consolidated into the reference list at the end of the thesis. The chapter is presented in manuscript form rather than its published format to comply with the copyright from IOS Press which specifies that the article may be reprinted from Advances in Communication and Swallowing, vol.24: page 99-110., Copyright (2021), with permission from IOS Press. The publication is available at IOS Press through: http://dx.doi.org/10.3233/ACS-210028

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# Circumstances and outcomes of falls in hospital for adults with communication disability secondary to stroke: A qualitative synthesis


## Abstract

**Background:** Falls are a significant patient safety concern in hospital. Adult patients with stroke, and those with communication disability, are at an increased risk of falls during their hospital admission compared to patients without stroke or communication disability.

**Objective:** The aim of this review is to determine the circumstances and outcomes of falls in hospitalised patients with communication disability following stroke.

**Method:** A qualitative synthesis of 16 papers according to the Generic Reference Model of patient safety. This is a secondary analysis of studies in a systematic review of the association between communication disability after stroke and falls in hospitalised patients.

**Results:** In studies including participants with communication disability, falls commonly occurred at the patient bedside, during the day, and in transfers. However, no studies provided individual or group data specifically detailing the circumstances and outcomes of falls of the included participants with communication disability.

**Conclusion:** Research to date provides scant evidence on the circumstances and outcomes of falls in hospital patients with communication disability after stroke. This review performs a useful function in highlighting a glaring gap in the literature and the urgent need to enrich hospital falls prevention research that includes patients with communication disability following stroke. Findings of this review are discussed in relation to providing a framework for analysis of for future research.

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**Key words:** patient safety, falls, inpatient, stroke, communication disability, falls research

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## Introduction

Falls are a significant patient safety concern in hospitals; impacting on the patient and the health service, and accounting for 38% of documented patient safety incidents with up to 65% of patients with stroke falling at least once during their hospital admission (Batchelor et al., 2012; K. D. Hill et al., 2007; Walsh et al., 2016). Falls potentially result in a number of adverse consequences to both the patient and health service, including: serious injury, loss of functional capacity and reduced confidence and motivation to mobilise; increased length of stay; increased length of stay and can be fatal (Batchelor et al., 2012; K. D. Hill et al., 2007).

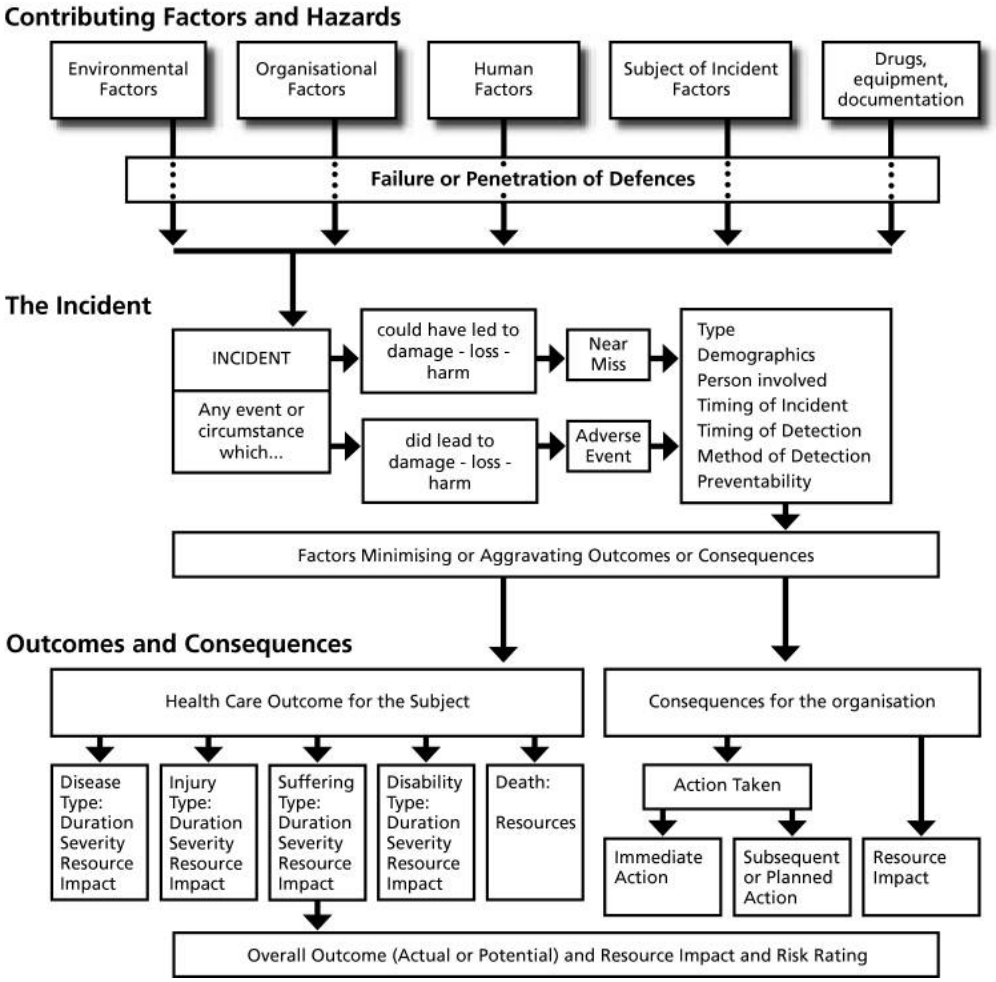
Communication disability is highly prevalent in people with stroke (O'Halloran et al., 2009), affecting an estimated 64% of this group (C.Mitchell et al., 2020) and including aphasia, dysarthria, apraxia of speech and cognitive communication impairments. People with communication disability have a three-fold increased risk for adverse events in hospital, including falls, compared to patients without communication disability (Bartlett et al., 2008). However, they are often excluded from falls research (Hemsley et al., 2019) and there is little information about the context of their falls or what would help prevent falls for this population. While a recent systematic review including a meta-analysis (n=11) found no association between falls and communication disability, studies were limited by not including participants with severe communication disability, or failure to report on the severity of participants' communication difficulties (Sullivan et al., 2020). In the only study focusing on patients with severe communication disability and their falls following stroke, these patients had twice the risk of falling while in hospital as those who could communicate basic needs (Sullivan & Harding, 2019). Further, Sze et al. (2001) suggested that patients with communication disability who have difficulties expressing their needs may

engage in risk taking behaviours such as attempting to mobilise alone. In addition to difficulties communicating their needs, patients with communication disability following stroke may have difficulties understanding and following instructions, such as those required to safely transfer (e.g., sitting to standing). Indeed, Zdobysz et al. (2005) suggest a patient may fall during transferring if "the patient does not understand or remember verbal instructions" (p. 70). Further, Mion et al. (1989) and Nyberg and Gustafson (1995) reported a higher incidence of falls in patients who had difficulties following instructions. With little information available explaining the needs of this population in relation to falls in hospital, it is important to identify from prior research any contributing factors, hazards, and outcome of falls for this vulnerable and under-researched group (Hemsley et al., 2019; Sullivan et al., 2020; Sullivan & Harding, 2019).

Patient safety frameworks provide structure in collecting information about patient safety incidents and consider the interaction between contributing factors or hazards, characteristics of the patient, mitigating factors and outcomes. This can help to identify ways to prevent safety incidents and reduce their negative impacts on patients and health services. The Generic Reference Model (W. B. Runciman et al., 2006) is a patient safety framework that can be used to guide the process of collecting and classifying information about patient safety incidents. The model is underpinned by a risk management structure and outlines relationships between contributing factors, the patient safety incident and the outcomes and consequences for the patient and the organisation (see Figure 1). As this model contains and organises the important elements of a patient safety incident to facilitate the analysis of the incident it was chosen to guide the data analysis and to provide a theoretically sound means of synthesising findings across studies (K. Walshe & Boaden, 2006).

**Figure 1**

*The Generic Reference Model (Runciman et al., 2006).*

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In the Generic Reference Model (W. B. Runciman et al., 2006), contributing factors and hazards for the incident are grouped into five categories: environmental factors; organisational factors; human factors; subject of incident factors; and drugs, equipment, and documentation. Table 1 provides examples of each of these factor types relating to falls in hospital. In patient safety research utilising this model, the incident is investigated in terms of the demographics of the person involved, timing of the incident, when and how the incident was detected, and preventability of the incident. Outcomes

and consequences of the incident are explored for both the patient and the organisation (e.g., the hospital) in relation to patient's injury, suffering, disability, and any impact on organisational resources.

**Table 1**

*Examples of Contributing Factors and Hazards in Falls in Hospitals*

| **Environmental factors** | **Organisational Factors** | **Human Factors** | **Subject of Incident Factors** | **Drugs, equipment, documentation** |
|---|---|---|---|---|
| Lighting; floor surface; cords/tubing; distance to bathroom; unstable furniture; position of items in reach | Staffing levels; falls prevention policy; falls prevention education | Communication breakdown; inappropriate assistance by staff/family | Intrinsic risk factors such as balance impairments, dependence for activities of daily living, neglect; footwear | Medications, equipment failure or malfunction, documentation error regarding assistance for transfers |

Factors within or intrinsic to patients with stroke (e.g., their impairments, activities or personal factors) are multifactorial and include balance impairments, increased dependence for activities of daily living tasks, and hemi-neglect (Batchelor et al., 2012; Campbell & Matthews, 2010; Walsh et al., 2016). When considering the Generic Reference Model (W. B. Runciman et al., 2006), little is known about other contributing factors for the falls of patients with communication disability after stroke including aspects of the environment and the patient's activities on the ward. Understanding more about the circumstances and outcomes of falls in hospital patients with stroke and communication disability could provide useful information to identify appropriate prevention strategies and thus reduce the risk or incidence of falls in this vulnerable patient group.

Therefore, the aim of this review was to provide a secondary analysis of the literature located in a prior systematic review and meta-analysis, on the circumstances and outcomes of falls in hospital patients with communication disability secondary to stroke, including factors leading up to, occurring during, or following a fall. The prior systematic review (Sullivan et al., 2020) sought to identify any association between communication disability following stroke and falls and involved the same population and search terms suitable for the present review. Given the high rates of exclusion of people with communication disability in the falls literature (Hemsley et al., 2019), the studies within the prior systematic review provided an opportunity to understand more about the nature of falls in cohorts of hospital patients known to include people with communication disability following stroke. Reviewing these studies with a focus on the contextual factors surrounding falls could help to identify ways to reduce the risk of falls, and to inform the design and analytic framework of future falls risk and prevention research and patient safety programs that are inclusive of this population.

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## Methods

### *Study Selection for This Review*

*The primary systematic review.* The prior systematic review, from which the studies in this paper are drawn, was registered a priori on PROSPERO (CRD 42019137199) and followed the PRISMA guideline (Page et al., 2021). The search methods of the prior systematic review, conducted across five scientific databases in July 2019, are available from the first author and published in (Sullivan et al., 2020). In summary, the studies included in that review met the inclusion criteria of all being full papers on original research including adult participants admitted to acute or subacute hospital services following a stroke; and all including comparative falls data for people with and without communication disability (required for the meta-analysis). Studies must have included at least one participant with communication disability in the sample.

*The present review.* This review expanded on the inclusion criteria of the primary review (Sullivan et al., 2020) to (a) enable the inclusion of any previously excluded studies which lacked the comparative data but met all other inclusion criteria; and (b) also require all studies to also have reported data on the circumstances or outcomes of the falls.

### *Quality appraisal*

The risk of bias of the included studies was previously assessed by two authors (Sullivan et al., 2020) using the Quality Assessment Tool for Studies with Diverse Designs (QATSDD), a 16-item tool validated and applicable to research with heterogeneous study designs (Sirriyeh et al., 2011). The QATSDD examines 14 items for quantitative and qualitative studies and 16 items for mixed methods studies; with a maximum score of 42 for quantitative and qualitative studies and 46 for mixed methods studies. Scores are converted to a percentage to allow comparison across studies. The

items examine theoretical framework; research aims; setting; sample size and representativeness; data collection process and rationale; appropriateness of data analysis, reliability and validity; user involvement; and strengths and limitations. Studies are scored according to these aspects using a 4-point scale, 0 (not at all/not stated) to 3 (complete/explicitly stated) (Sirriyeh et al., 2011).

*Data Extraction and Synthesis*

A data extraction table was created using Microsoft Excel to record bibliographic and methodological information, data and relevant results of each study. These data included (a) the study setting; (b) design; (c) participant demographics, including the percentage of the sample with communication disability; (d) the type and severity of communication disability and how this was assessed; (d) circumstances surrounding the fall (e.g., location of the fall, activity during the fall and time of day of the fall); and (e) outcomes from falls (e.g., injury rates).

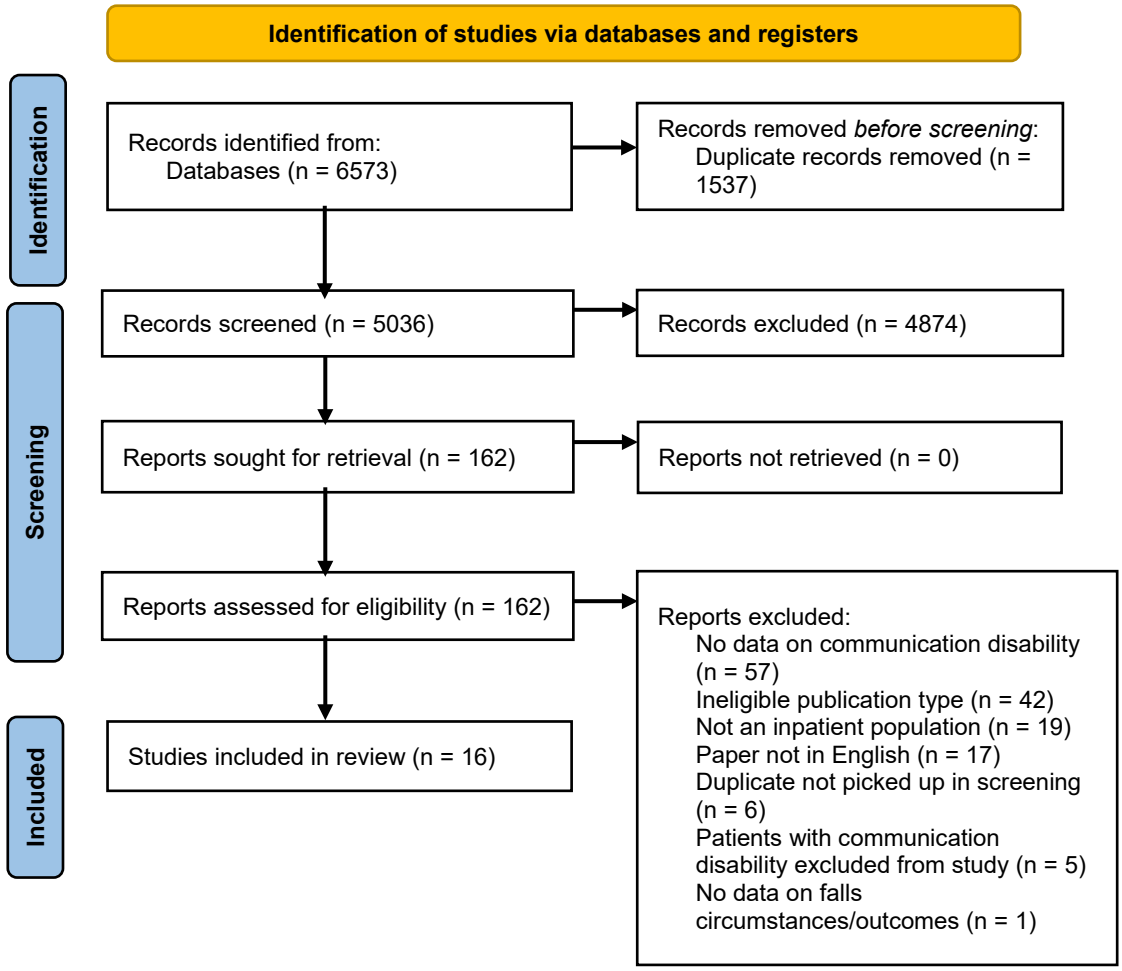
After the first author had extracted data from the included studies, the data were analysed using qualitative synthesis according to the Generic Reference Model (W. B. Runciman et al., 2006). This involved the first author coding the data according to factors within the Generic Reference Model (W. B. Runciman et al., 2006). Analysis was finalised in discussion with co-authors in order to reach consensus on the categories and themes identified within the data.

**Results**

The PRISMA flow diagram, depicting the screening and selection of studies, is presented in Figure 2.

**Figure 2**

*Study Selection Flowchart*




Of the 16 studies included in the prior systematic review (Sullivan et al., 2020), 15 met the expanded inclusion criteria for this review (see Table 2). Despite being selected due to known inclusion of patients with communication disability, none of the included studies specifically provided results on the circumstances and outcomes of falls for this population. The Generic Reference Model (W. B. Runciman et al., 2006) guides the reporting of the results with a focus on patient safety and the results are discussed specifically in relation to patients with stroke and communication disability.

*Risk of bias*

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The average risk of bias score across the included studies was 48.7%; with a range from 11.9% (Sinanovic et al., 2012) to 64.3% (Sullivan & Harding, 2019). The quality ratings of included studies are further detailed in Table 3.

**Table 2**

*Matrix of Results According to Generic Reference Model*

| | Contributing Factors and Hazards | | | | | Circumstances of falls | | | | Outcomes and Consequences | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Study** | **Environmental Factors** | **Organisational Factors** | **Human Factors** | **Subject of incident factors** | **Drugs, equipment, documentation** | **Type** | **Location** | **Timing of Incident** | **Activity Occurring** | **Patient injury** | **Patient suffering** | **Patient disability** | **Patient Death** | **Impact on organisational resources** | **Action Taken** |
| Baetens et al. (2011) | | | | X | | | | X | X | X | | | | | |
| Bugdayci et al. (2011) | | | | X | X | | X | X | X | X | X | | | | |
| Byers et al. (1990) | | | | X | X | | | X | | X | | | | | |
| Chaiwanichsiri et al. (2006) | | | | X | X | | X | X | X | X | | | | | |
| Czernuszenko (2007) | | | | X | X | | X | X | X | X | | | | X | |
| Czernuszenko and Czlonkowska (2009) | X | | X | X | X | | X | X | X | X | | | | | |
| Nyberg and Gustafson (1996) | | | | X | X | | | | | X | | | | | |
| Sinanovic et al. (2012) | | | | X | | | | X | | X | | | | | |
| Sullivan and Harding (2019) | | | | X | X | | | | | X | | | | | |
| Sze et al. (2001) | | | | X | | | X | X | X | X | | | | X | |
| Teasell et al. (2002) | | | | X | | | | | | X | | | | | |
| Tsur and Segal (2010) | X | | X | X | X | | X | X | | X | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ullah et al. (2019) | | | | X | X | X | X | X | | X | | | | | |
| Zdobysz et al. (2005) | | | | X | | X | X | | | | | | | X | |

**Table 3**

*Risk of Bias Using QATSDD*

| Study | Explicit theoretical framework | Statement of aims/objectives in main body of report | Clear description of research setting | Evidence of sample size considered in analysis | Representative sample of target group of a reasonable size | Description of procedure for data collection | Rational for choice of data collection tool | Detailed recruitment data | Statistical assessment of reliability and validity of measurement tools | Fit between stated research question and method of data collection | Fit between research question and method of analysis | Good justification for analytical methods selected | Evidence of user involvement in design | Strengths and limitations critically discussed | Total (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baetens et al. (2011) | 3 | 3 | 2 | 0 | 2 | 3 | 1 | 2 | 0 | 3 | 3 | 1 | 0 | 3 | 26 (61.9) |
| Bugdayci et al. (2011) | 2 | 2 | 3 | 0 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 0 | 0 | 1 | 20 (47.6) |
| Byers et al. (1990) | 2 | 3 | 2 | 0 | 2 | 3 | 1 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 31 (73.8) |
| Chaiwanichsiri et al. (2006) | 1 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 14 (33.3) |
| Czernuszenko (2007) | 3 | 3 | 3 | 0 | 3 | 3 | 0 | 2 | 0 | 2 | 1 | 0 | 0 | 3 | 23 (54.8) |
| Czernuszenko and Czlonkowska (2009) | 3 | 3 | 3 | 0 | 3 | 3 | 0 | 3 | 0 | 2 | 3 | 1 | 0 | 2 | 26 (61.9) |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nyberg and Gustafson (1996) | 2 | 3 | 3 | 0 | 2 | 2 | 0 | 3 | 0 | 3 | 2 | 0 | 0 | 2 | 22 (52.4) |
| Schmid *et al.* (2010) | 2 | 3 | 2 | 0 | 1 | 2 | 2 | 1 | 0 | 2 | 2 | 0 | 0 | 3 | 20 (47.1) |
| Sinanovic et al. (2012) | 0 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 (11.9) |
| Sullivan and Harding (2019) | 3 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | 0 | 2 | 3 | 3 | 0 | 3 | 27 (64.3) |
| Sze et al. (2001) | 3 | 3 | 3 | 0 | 2 | 2 | 2 | 3 | 1 | 2 | 2 | 0 | 0 | 1 | 24 (57.1) |
| Teasell et al. (2002) | 3 | 3 | 2 | 0 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 0 | 0 | 2 | 22 (52.4) |
| Tsur and Segal (2010) | 2 | 3 | 2 | 0 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 13 (31.0) |
| Ullah et al. (2019) | 2 | 3 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 12 (28.6) |
| Zdobysz et al. (2005) | 3 | 3 | 1 | 0 | 2 | 2 | 3 | 2 | 1 | 3 | 2 | 0 | 0 | 0 | 22 (52.4) |

*Characteristics of participants*

In total, there were 6935 participants included across the 15 studies. Twelve studies were based in a rehabilitation setting (Baetens et al., 2011; Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1996; Sullivan & Harding, 2019; Sze et al. 2001; Teasell et al., 2002; Tsur & Segal, 2010; Ullah et al., 2019; Zdobysz et al. 2005), and the proportion of patients who fell ranged from 3.3% (Sinanovic et al., 2012) to 64.5% (Byers et al., 1990). All of the studies reviewed included at least one participant with communication disability, and the proportion of participants with communication disability ranged from 9.8 (Bugdayci et al., 2011) to 68.0% (Sullivan & Harding, 2019). Further participant characteristics are outlined in Table 4.

**Table 4**

*Participant Characteristics*

| **Study & Setting** | **Sample size** | **Age**<br>**Mean (SD)** | **Gender**<br>**% male** | **% of participants with Communication Disability** |
|---|---|---|---|---|
| Baetens et al. (2011)<br>Rehabilitation | 73 | 64.6 (15.0) | 60 | 16.9 |
| Bugdayci et al. (2011)<br>Rehabilitation | 99 | 61.99 (11.79) | 42.4 | 9.8 |
| Byers et al. (1990)<br>Unspecified hospital | 313 | Fallers = 66.0 (14.8)<br><br>Non fallers = 69.3 (13.8) | 56.5 | Fallers:<br>Difficulty speaking = 18.8<br>Dysarthria = 11.9<br><br>Non Fallers:<br>Difficulty speaking = 30.6<br>Dysarthria = 18.9 |
| Chaiwanichsiri et al. (2006)<br>Rehabilitation | 151 | Fallers = 63.8 (10.8)<br><br>Non Fallers = 62.1 (11.5) | 56.9 | Fallers:<br>Aphasia = 20.8<br><br>Non Fallers:<br>Aphasia = 26 |
| Czernuszenko (2007)<br>Rehabilitation | 353 | 62 (14) | 56.4 | 38.8 |
| Czernuszenko and Czlonkowska (2009)<br>Rehabilitation | 1155 | 61.5 (14.3) | 56.5 | 38 |
| Nyberg and Gustafson (1996)<br>Rehabilitation | 142 | 74.8 (8.9) | 51.1 | 25.7 |
| Schmid *et al.* (2010)<br>Acute | 1269 | 71.21 (13.3) | 56 | 35 |

| | | | | |
|---|---|---|---|---|
| Sinanovic et al. (2012)<br>Acute | 1809 | Not reported | 55.7 | Fallers<br>Aphasia = 77.05 |
| Sullivan and Harding (2019)<br>Rehabilitation | 149 | 75.8 | 57 | 68 |
| Sze et al. (2001)<br>Rehabilitation | 727 | Reported as under 65 and over 65 yrs. | 53.3 | Fallers = 32.2<br>Non-Fallers = 19.0 |
| Teasell et al. (2002)<br>Rehabilitation | 238 | 72.7 (10.1) | 49.8 | Fallers = 34.5<br>Non-Fallers = 37.8 |
| Tsur and Segal (2010)<br>Rehabilitation | 41 | 67 (8.9) | Not reported | Fallers = 29 |
| Ullah et al. (2019)<br>Rehabilitation | 146 | 59.9 (13.16) | 65.8 | 55.4 |
| Zdobysz et al. (2005)<br>Rehabilitation | 1014 | Range 20 - 89 | 47.5 | Not reported |

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*Contributing Factors and Hazards*

The contributing factors and hazards for falls were reported to varying degrees and with great diversity in the results. Although all studies reported on the person's intrinsic risk factors for falls, there was little commonality in the factors that contribute to falls. A wide variety of medications for participants were noted in 10 of the studies (Bugdayci et al., 2011; Byers et al., 1990; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1996; Schmid, Wells, et al., 2010; Sullivan & Harding, 2019; Tsur & Segal, 2010; Ullah et al., 2019), but no evidence that this was a factor contributing to the falls in these studies. Investigation of environmental and third-party human factors beyond the patient were scant; reported in only two studies being inadequate or insufficient assistance by staff or visitors, wet flooring, and instability of a wheelchair (Czernuszenko & Czlonkowska, 2009; Tsur & Segal, 2010).

*Circumstances of the incident*

The circumstances of the falls in participants were reported in reference to the (a) location of the fall (Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Sze et al., 2001; Tsur & Segal, 2010; Ullah et al., 2019; Zdobysz et al., 2005a), (b) time of day (Baetens et al., 2011; Bugdayci et al., 2011; Byers et al., 1990; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Sinanovic et al., 2012; Sze et al., 2001; Tsur & Segal, 2010; Ullah et al., 2019), and (c) activity being performed prior to the fall (Baetens et al., 2011; Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Sze et al., 2001). Across the studies, falls commonly occurred in the patient's bedroom or bedside, during the day and during transfers (e.g., from bed to chair). Witnessed, unwitnessed or assisted falls

were reported in only two studies (Ullah et al., 2019; Zdobysz et al., 2005a), providing little detail on other factors that may contribute to these falls. Family members or visitors provided protection against falls for people with stroke in hospital population in five studies (Baetens et al., 2011; Bugdayci et al., 2011; Byers et al., 1990; Chaiwanichsiri et al., 2006; Ullah et al., 2019). However, two others reported that inappropriate assistance provided by family and visitors contributed to a fall (Czernuszenko & Czlonkowska, 2009; Tsur & Segal, 2010).

*Outcomes and Consequences*

The severity of and type of physical injury was reported in 13 studies (Baetens et al., 2011; Bugdayci et al., 2011; Byers et al., 1990; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Nyberg & Gustafson, 1996; Sinanovic et al., 2012; Sullivan & Harding, 2019; Sze et al., 2001; Teasell et al., 2002; Tsur & Segal, 2010; Ullah et al., 2019), with the majority of participants sustaining either no injury or a mild injury from falling, whereas the range of participants reporting a severe injury (such as fractures) was 0.6 (Teasell et al., 2002) to 5.6% (Baetens et al., 2011). Three studies (Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Ullah et al., 2019) reported a statistically significant difference in the length of stay of patients with stroke who fell in comparison to patients who did not fall. In contrast, Schmid et al. (2010) found no difference in length of stay for patients with stroke who did or did not fall.

**Discussion**

This review synthesised evidence on the reported circumstances and outcomes of falls in patients with stroke in hospital, in studies where at least one participant with communication disability was included. The Generic Reference Model (Runciman et al., 2006) provided the theoretical framework for the analysis. Falls are one of the most

common complications to occur after stroke (Verheyden et al., 2013) and despite the relatively low occurrence of severe injury associated with falls, the continued occurrence of falls is a persistent and challenging problem. The majority of falls in people with stroke described in studies included in this review occurred at the patient's bedroom or bedside, and were unwitnessed, is of concern; considering that patients spend the majority of their time during hospitalisation in their bedroom and alone (West & Bernhardt, 2012). That the most common activity being performed prior to a fall was transferring (e.g., from bed to wheelchair) is also important, considering that transfers are an activity that patients often undertake on any hospital ward and are an important goal of rehabilitation (Baetens et al., 2011).

Although this body of literature was selected due to known inclusion of patients with communication disability, none reported on factors, circumstances, or outcomes of falls specifically in relation to this population. This is an unfortunate limitation in the literature that the studies included in this review did not yield further insights or help explain the increased risk of falls in patients with stroke and communication disability in hospital. In a recent systematic review of 61 studies on falls of adult hospital patients with communication disability, Hemsley et al. (2019) found that despite two thirds of the studies identifying communication disability as a contributing factor for falls, patients with communication disability were actively excluded from participation by the recruitment methods or data collection and results across all studies rarely mentioned any participants with communication disability who had been included.

The majority of studies in this review aimed to identify the intrinsic risk factors associated with falls in people with stroke, an essential element required to mitigate these patient safety incidents. Beyond this, the studies reviewed provide little insight into other factors such as environmental and organisational factors (e.g., staffing ratios)

surrounding falls in patients with stroke that could inform strategies designed to reduce the risk of falls in stroke patients with communication disability. The identification of intrinsic risk factors such as balance impairments informs the development of falls prevention interventions, however, identification of these factors alone is unlikely to prevent a fall (Taylor & Hignett, 2016).

Patients with communication disability following stroke may have unique intrinsic factors that contribute to their falls due to difficulties communicating with health professionals involved in their care (Simmons-Mackie & Kagan, 2007; Sullivan et al., 2020; Sze et al., 2001). These difficulties could impact a patient's ability to understand and follow the instructions required to transfer, use equipment and ambulate safely, resulting in a fall (Mion et al., 1989; Nyberg & Gustafson, 1995; Zdobysz et al., 2005). Thus, staff providing instruction or assisting with tasks such as transferring might need to make adaptations to their communication to meet the patient's communication needs (e.g., for understanding information and following instructions) in order to minimise the risk of a fall.

Further, environmental factors (e.g., floor surface, and placing items such as the call bell in reach of the patient) are modifiable and may have a significant impact on the safety of patients during their hospitalisation (Taylor & Hignett, 2016). Problems for people with communication disability gaining attention in hospital (Balandin et al., 2001; Hemsley et al., 2013) may lead patients to have difficulty in alerting staff to their basic needs and potentially increase patient risk taking behaviour to access food, toileting, and personal care (Sullivan & Harding, 2019, Sze et al. 2001). None of the studies reviewed provided a comprehensive evaluation of all these factors in the circumstances leading up falls, in prioritising attention to the intrinsic factors.

The finding that the presence of family members or visitors may be a protective factor for falls in this population (Baetens et al., 2011; Bugdayci et al., 2011; Byers et al., 1990; Chaiwanichsiri et al., 2006; Ullah et al., 2019) might help to explain the finding that falls occur while patients are alone as it is possible that family members and visitors are acting to prevent falls (e.g., by providing assistance to reach items or instructing to wait for nursing assistance or use the call bell) (Hemsley et al., 2013). However, two studies also suggested that family members and visitors may provide inappropriate assistance or supervision and contribute to a fall (Czernuszenko & Czlonkowska, 2009; Tsur & Segal, 2010), suggesting that family members and visitors should receive instruction regarding appropriate assistance and supervision needed for patients with stroke, including specific communication strategies to support patients with communication disability in hospital; and that family members and visitors should be included in falls risk policies in hospitals so that their role in preventing falls is made clear. Although studies did not specify recommendations relating to patients with communication disability, it is likely that the involvement of family and visitors in hospital could be supportive of their interactions with hospital staff (Hemsley et al., 2013).

Communication between patients and healthcare providers is essential to the provision of good healthcare (Sherman et al., 2009) and poor communication with patients with communication disability is associated with increased rates of adverse events, including falls (Bartlett et al., 2008; Hemsley et al., 2013; Hemsley & Balandin, 2014). Whilst augmentative and alternative communication, such as the use of picture boards, may help patients with communication disability communicate more effectively in hospital, these strategies are not universally applicable to every patient with communication disability (Lasker & Garrett, 2008). Communication partners such as

nurses and allied health professionals, continue to play an essential role in supporting effective communication for patients with communication disability in hospital. Adapting communication to use short sentences, single step instructions, and specific language (e.g., using words such as 'put your foot next to mine' rather than 'put it here') could help to support comprehension of the safety requirements of the task, and eliminate the risk of other human factors in a fall as described in Czernuszenko & Czlonkowska, (2009) and Tsur & Segal (2010). Additionally, given the large proportion of people with stroke who have difficulties with language (O'Halloran et al., 2009) or cognitive function (Renjen et al., 2015) any preventative strategies undertaken should take into consideration the special requirements of this population.

*Limitations and Directions for Future Research*

This review is a secondary analysis of studies included in recent systematic review and meta-analysis investigating the association between communication disability following stroke and falls in hospital (Sullivan et al., 2020). While there is potential that some relevant studies may have been missed due to this method, the risk of this is low considering the extent of the initial search and the close similarities of that search to the aims of this review. Although the original review focussed on papers reporting quantitative data, this criterion was applied following the search, thus reapplying the criteria for this review to papers excluded due to a lack of comparative data protects against the possibility of papers using a qualitative method being excluded.

A significant limitation of the literature is the lack of specific detail regarding the circumstances and outcomes for falls in patients with stroke and communication disability. The studies included in this review offered relevant but inconsistent forms of data reporting of the circumstances and outcomes of falls in people with stroke, as shown by the use of the Generic Reference Model as an analysis tool (Runciman et al.,

2006). With limited information regarding causes for falls and rates of witnessed or unwitnessed falls, a more detailed investigation of the patient experience of falls may provide further insights into how the patient themselves might learn or implement protective and preventative strategies (Wei et al., 2019). Should this be combined with more detailed information on extrinsic factors, as well as the already recognised intrinsic factors, a greater understanding of the safety framework for falls in patients with stroke could inform new protocols for keeping patients with stroke and communication disability safe in hospital.

Further research is required to understand (a) the interaction of the patient's intrinsic factors with the other contributing factors (e.g., environmental factors) in the circumstances surrounding falls, and (b) the role of extrinsic risk factors and ways that any environmental factors may be modified, particularly for patients with communication disability. Looking beyond intrinsic factors to the communication skills of staff in relation to falls prevention, would also be important, as effective communication between healthcare providers and patients is an essential component of patient safety and increases the likelihood that patients will understand and follow recommendations (Blackstone et al., 2011).

Future research should move beyond quantification and statistical analysis of risk factors to engage more thoroughly with the complexity of the hospital environment. The reliance on quantitative methodologies for falls research potentially oversimplifies the sophisticated interactions involved in a complex and dynamic hospital environment with factors related to communication disability (Hoff & Sutcliffe, 2006); bypassing several contributing factors and hazards and outcomes that this environment might bring to falls. The present review will be used to inform the analytic framework for mixed

methods research which captures the insights and understandings from people who experience a fall and those surrounding them.

**Conclusion**

This synthesis review of 15 studies, located and selected using systematic search procedures, provides scant insights on the hospital falls of adults with communication disability following stroke, highlighting a glaring gap in the falls prevention literature. The findings suggest that falls commonly occur in the patient's bedroom or bedside, during transfers, during the day, and when the patient is alone. Although severe injury is uncommon, one outcome of these falls is a significantly increased length of stay in hospital. However, limitations in the reporting of the incident characteristics or the circumstances of the fall, other contributing factors in the environment, and lack of specific data relating to patients with communications disabilities after stroke indicates a need for further research on the falls in this population. Such research should not only increase focus on the patient's communication skills and impairments, but also take more than the patient's intrinsic factors into account to include examination of environmental factors and outcomes to falls for this vulnerable patient group.

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## Chapter 4: Hospital Policies on Falls in Relation to Patients with Communication Disability: A Scoping Review and Content Analysis

Chapter 2 highlighted the limitations in the literature regarding any certainty of association between communication disability (as a non-specific category) and an increased risk of falls in hospital. Chapter 3 highlighted gaps in relation to contributing factors, circumstances, and outcomes of falls in hospital patients with communication disability following stroke. Chapter 4 addresses this issue from a policy perspective, by reviewing a sample of Australian policy documents addressing hospital falls at the national, state, and organisational level. This study aimed to determine how hospital falls policies relate to patients with communication disability and identify gaps in policy that need to be addressed.

This review was published in Australian Health Review. The published version of this article can be found at:

Sullivan, R., Hemsley, B., Skinner, I., & Harding, K. (2023) Hospital policies on falls in relation to patients with communication disability: A scoping review and content analysis. *Australian Health Review 47*(4), 487 – 493. https://doi.org/10.1071/AH22289

The content included in this chapter is identical to the manuscript accepted for publication. However, the formatting has been modified to match the format and style of the thesis, and the references have been consolidated into the reference list at the end of the thesis. The chapter is presented in manuscript form rather than its published format to comply with the CSIRO Publishing Licence to Publish agreement (Manuscript No. AH22282) which specifies that the pre-publication version of this article may be used in this thesis.

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**PUBLISHED MANUSCRIPT STARTS HERE**

# Hospital Policies on Falls in Relation to Patients with Communication Disability: A Scoping Review and Content Analysis


## Abstract

**Background**: Falls in hospital are a significant public health issue and patients with communication disability have unique risk factors that have the potential to contribute to falls.

**Aim**: To determine how the content of hospital falls policies relate to patients with communication disability and to identify gaps in policy that need to be addressed.

**Design**: A scoping review and content analysis of (a) policies and related documents, from a target health service in Victoria, Australia, and all relevant Australian state and territory health departments; and (b) national guidelines.

**Methods**: Data were analysed for content relating to inclusion of patients with communication disability.

**Results**: Communication disability is not captured as a risk factor for a fall in assessment tools. When included, aspects of communication disability were often conflated with cognitive impairments. There was little guidance for staff on adapting falls prevention education to suit the needs of patients with communication disability and limited identified role for speech pathologists.

**Conclusion**: This study suggests that a patient's communication disability is not visible in hospital falls policies and guidelines.

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## Introduction

Falls in hospital are a significant public health issue and by 2051, it is projected that the economic burden of falls related injuries in Australia will increase almost threefold to nearly $1.375 billion per annum (Australian Commission on Safety and Quality in Health Care., 2019; Moller et al., 2003). Through the Australian Council on Health Care Standards and the Australian Commission on Safety and Quality in Health Care, there is a national framework for health services to manage the risk of harm to patients during their hospital journey.

Falls prevention is an important element of the national health policy agenda and there is extensive literature on falls risk, screening tools and falls prevention programs that inform hospital policy and guidelines (Cameron et al., 2012; Clemson et al., 2010; Oliver et al., 2004). And yet, there remain gaps in the literature examining hospital falls prevention policies on the care of patients with communication disability. Given the high prevalence of communication disability across hospital populations (e.g., stroke, dementia, hearing impairment) and a significantly increased risk for safety incidents for patients with communication disability in hospital (Bartlett et al., 2008), it is reasonable to expect that hospital policy documents would provide guidance for clinicians to decrease the risk of falls for this population, in particular those with stroke. Adults with communication disability following stroke may be at increased risk of falls as they have unique factors that contribute to their falls in hospital, including difficulty accessing the call bell, and communicating their basic needs (e.g., for using the toilet) (Hemsley et al., 2013, 2019; Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, Skinner, et al., 2023; Sullivan & Harding, 2019; Sze et al., 2001). Further, patients with communication disability may also have difficulty in accessing the information

provided in falls prevention education, an intervention known to be effective in reducing injurious falls in hospital (A.-M. Hill et al., 2015).

A review of hospital and health service policy and guidance on falls in hospital provides an insight into current practices within health services. The aims of this review are: (a) identify and synthesise content relating to patients with communication disability, (b) identify gaps in policy and guidelines, and (c) consider ways that patients with communication disability may be included in both screening and prevention programs.

## Methods

### Search Methods

The search was focused on policies at the local, state and territory, and national levels of the Australian health care system. This system has a complex governance structure in which each local health care service operates under several standards and guidelines to reduce risk for patient safety incidents and guide clinical care (Australian Commission on Safety and Quality in Health Care., 2019; Australian Institute of Health and Welfare, 2022; OECD, 2015). Health care service falls policies are based on scientific evidence, views of experts, state and national government policies; as well as the Australian Commission on Safety and Quality in Health Care standards. To reflect this complex framework, a metropolitan health service in Victoria, Australia, was selected as an example health service for sampling of policy documents at the health service level. The documents obtained from this health service were considered an example of how falls policies and guidelines appear at the health services level. A geographic search strategy was then applied to locate falls policies at the state and territory and national levels of the Australian health care system.

## Search Strategy

In July 2022, 10 internet sites were searched for publicly available information relating to falls in hospital using the search terms ‘falls’, ‘falls policy’, and ‘falls assessment tools’ to create a database of documents that are publicly available relating to falls (https://www.canberrahealthservices.act. gov.au; https://www.health.nsw.gov.au; https://www. health.qld.gov.au; https://nt.gov.au; https://www.health. wa.gov.au; www.sahealth.sa.gov.au; https://www2.health. vic.gov.au; www.health.tas.gov.au; https://www.safetyand quality.gov.au; intranet of target health service). Relevant links located within those websites were followed to apply the inclusion/exclusion criteria (see Table 1). Where documents covered falls in all settings, only data relating to the hospital setting were extracted and included in the analysis.

**Table 1**

*Inclusion and Exclusion Criteria*

| **Inclusion** | **Exclusion** |
|---|---|
| The document is in place at:<br>• the target health service<br>• Australian state or territory level<br>• National level policy or documents encompassing all accredited Australian hospitals | Documents related to falls in other settings |
| One of the following types of documents:<br>• policies and guidelines relating to preventing falls and harm from falls in hospital<br>• falls risk assessment tools used in hospital<br>• falls prevention strategies<br>• staff education on falls risk or prevention<br>• consumer information on falls prevention<br>• accreditation standards for Australian hospitals regarding preventing falls and harm from falls | |

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## Data Analysis

To facilitate a detailed content analysis, documents were analysed according to its intended audience: (i) documents aimed at hospital, health services, or hospital staff; and (ii) documents aimed at patients, consumers, or people at risk of falling. All authors reviewed the documents and discussed the resulting content themes to arrive at consensus that the analysis reflected the content of the documents.

### Documents Aimed at Hospitals, and Hospital Staff.

As data were collected, an iterative process of data extraction and analysis was conducted in a constant comparison manner and data were analysed both inductively and deductively in NVivo (QSR International Pty Ltd, 2020). The Generic Reference Model of patient safety (W. B. Runciman et al., 2006) guided the deductive data extraction. This model is a descriptive patient safety framework and encapsulates; (a) risk factors, (b) incident details, and (c) factors that describe the consequences of the incident for the patient and the organisation. Data that did not fit into the model were analysed inductively to develop a framework of content themes.

### Documents Aimed at Patients and Consumers.

An Excel database was created to analyse and code the consumer information and education documents according to their content. Each document was assessed by the authors for its information accessibility for people with communication disability, see Box 1 for details (T. Rose et al., 2003). A binary judgement of 'yes' or 'no' was applied for each feature of each document.

| **Box 1. Information accessibility features for people with communication disability** |
| --- |
| Use of simple words and short sentences |
| Large and standard font |
| White space |
| Use of relevant pictures |
| Use of headings and sectioned information |
| Highlighting key information |

## Results

The search yielded 45 documents meeting the inclusion criteria (see Table 2). There were six major content themes relating to people with communication disability, organised according to either the assessment or screening of falls risk, and the prevention of falls (see figure 1). The theme relating to guidance for staff to facilitate inclusion of people with communication disability in falls screening, assessment or prevention is reported within the results relating to the first five themes.

**Figure 1**

*Content Themes Relating to People with Communication Disability in Falls Policies and Documents*

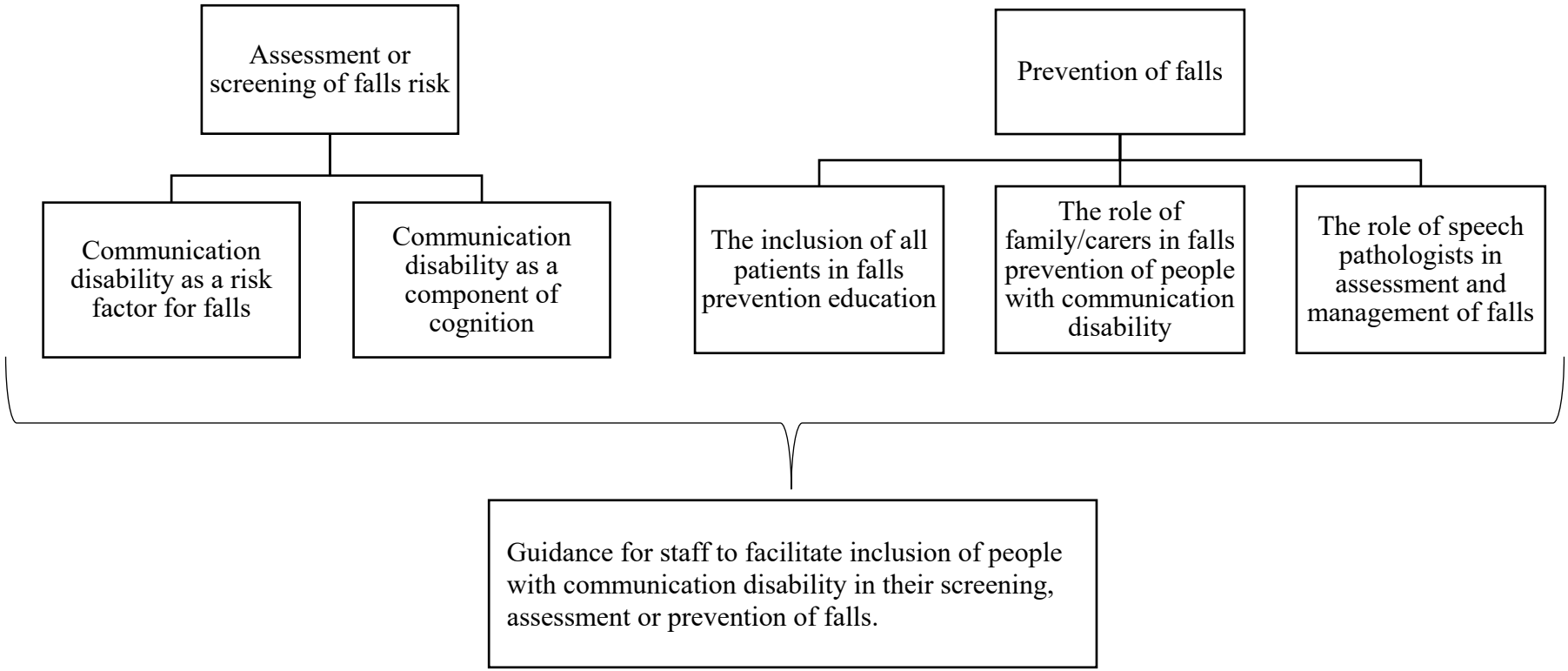

**Table 2**

*Included documents*

| Category | Document | Organisation |
|---|---|---|
| National Standards | Action 5.24 Preventing falls and harm from falls | Australian Commission on Safety and Quality in Healthcare |
| | Action 5.25 Preventing falls and harm from falls | Australian Commission on Safety and Quality in Healthcare |
| | Action 5.26 Preventing falls and harm from falls | Australian Commission on Safety and Quality in Healthcare |
| | Preventing Falls and Harm from Falls in Older People | Australian Commission on Safety and Quality in Healthcare |
| Guidelines or Policy | Canberra Hospital and Health Services Procedure (Falls – Assessment, Management and Prevention) | Canberra Hospital and Health Services |
| | Assessing Risk of Falls and Preventing Harm from Falls Guideline | Health Service |
| | Minimising Patient Harm from Falls, Pressure Injury, Malnutrition, Dehydration, Delirium and Cognitive Impairment Standard | Health Service |
| | Falls Prevention Program | NSW Health |
| | Implementation Standard for Preventing Falls and Harm from Falls | QLD Health |
| | Preventing Falls and Harm From Falls Model Policy | QLD Health |
| | Fall and Fall injury prevention and management toolkit – When and how to do fall risk screening, assessment, care planning and discharge planning | SA Health |
| | Fall and Fall Injury Prevention and Management Policy Directive | SA Health |
| | Falls in hospital | VIC Health |
| | Falls prevention in hospital | VIC Health |
| | Identifying falls risk | VIC Health |
| Assessment Tool | Falls Risk Assessment Tool (FRAT) | Health Service |
| | Integrated Risk Assessment | Health Service |
| | Falls Risk Assessment and Management Plan (FRAMP) | NSW Health |

| | | |
|---|---|---|
| | Ontario Modified Stratify (Sydney Scoring) Falls Risk Screen | NSW Health |
| | In-Patient Falls Assessment and Management Plan | QLD Health |
| | Falls and Fall Injury Risk Assessment | SA Health |
| | Falls and Fall Injury Risk Review | SA Health |
| | Falls Risk Screen | SA Health |
| | Falls Risk Assessment and Management Plan (FRAMP) | WA Health |
| Falls Prevention | Fall Prevention Pathway – Staying Independent for Longer | Health Service |
| | Suggested strategies and equipment to address falls risk factors in hospital and residential care settings | Health Service |
| | Hospital Fall Prevention Strategies | NSW Health |
| | Falls and Fall Injury Risk Factor Assessment – Recommended Actions for Consideration | SA Health |
| Staff Information | Falls facts for allied health professionals | Australian Commission on Safety and Quality in Healthcare |
| | Falls facts for doctors | Australian Commission on Safety and Quality in Healthcare |
| | Falls facts for health managers | Australian Commission on Safety and Quality in Healthcare |
| | Falls facts for support staff (cleaners, food services, and transport staff) | Australian Commission on Safety and Quality in Healthcare |
| | Give it a Go! Guide – Help your patients to mobilise safely | NSW Health |
| | Pointers for safe mobilisation – Give it a Go! – Information for clinicians & Health professionals | NSW Health |
| Consumer Information | Falls Prevention – In Hospital | NSW Health |
| | Moving around safely in hospital – Information for patients, families and carers | NSW Health |
| | Patients who are confused could fall when in hospital – information for families and carers | NSW Health |
| | Falls in hospitals | Northern Territory Health |
| | Stay on Your Feet in hospital and prevent falls - Be Safe | QLD Health |
| | Call, don’t fall! | QLD Health |

| | | |
|---|---|---|
| | Don’t fall for it. Falls can be prevented! | SA Health |
| | Keeping Safe and Independent in Hospital | SA Health |
| | Preventing falls in hospital | Vic Health |
| | Staying safe during and after hospital – preventing falls | WA Health |
| | Staying safe from falls in hospital | Canberra Health Services |

## Assessment of Falls Risk

### *Communication disability as a risk factor for a fall*

Across the falls risk assessment and screening tools, there was a strong focus on screening for and identifying known falls risk factors. In relation to communication disability, difficulties following or recalling instructions were included on 2 of the 9 tools. Communication disability as a risk factor for a fall was also identified on a poster advocating for nurse-led mobilisation of patients, where nurses were to consider mobilising patients if the patient was able to follow simple instructions and complete basic mobility tasks. The flowchart provided considerations for management of physical limitations such as transferring using equipment but did not provide any considerations for what to do if the patient was unable to follow instructions.

### *Communication disability as a component of cognition*

When screening or assessing for risk of falls, aspects of communication disability were often subsumed into cognitive domains of the tools, or conflated with cognitive impairments, including ‘dementia’, ‘delirium’, and ‘confusion’. The ‘Preventing Falls and Harm from Falls in Older People: Best Practice Guidelines for Australian Hospitals’ (Australian Commission on Safety and Quality in Healthcare, 2009) document included special consideration sections for all topics, where further suggestions or adaptations to recommendations are made for people with cognitive impairments. Throughout these sections, references were made to difficulties with communication in relation to the use of interpreters. No suggestions or adaptations were outlined or recommended for people with communication disability.

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## Prevention of Falls

### *Inclusion of all patients in falls prevention education*

All policies pertaining to fall prevention strategies and education included recommendations that patients be included in the development of their falls prevention plan; and be provided with education regarding falls risk and prevention strategies. However, many falls prevention plans rely on the patient having proficient verbal comprehension skills (e.g., orientation to the ward, using the call bell and understanding education regarding falls risk and prevention). There was no guidance provided for staff to assist in adapting these tasks to meet the needs of patients with communication disability, in particular difficulties with comprehension (e.g., use of simplified format, or multimodal communication including use of gestures, or pictures or video modelling).

Written information available to patients at risk of falls relies on the ability to read and understand the English language. Only one document provided direction to adapt the document for a person with a disability. In terms of the information accessibility of the documents, the majority of brochures used short sentences, but with complex linguistic forms which are a barrier to understanding the written information for patients with communication disability. A standard font was used for all brochures, but there were inconsistent font sizes and highlighting of key information and the use of relevant pictures to facilitate understanding was rare.

### *Role of family members and carers in falls prevention for people with communication disability*

All documents pertaining to falls prevention education (i.e., risks and intervention strategies) indicated that education should be provided to both patients and carers or family members. For patients who were unable to participate in falls

prevention education, the documents recommended that staff provide this education to family or carers as an alternative. Additionally, there was a reliance on family members or carers to take an active role in falls prevention strategies when the patient was perceived not to be able to do this for themselves.

***Role of speech pathologists in assessment and management of falls***

Aside from the central role of nursing and medical staff, the role of the multidisciplinary team (including support staff) were identified in both the assessment of and prevention of falls; with discipline-specific fact sheets available outlining their responsibilities. The role of speech pathologists in falls prevention for patients with communication disability was mentioned in one risk screening tool, where severe difficulties with speaking or following instructions were identified, a referral to a speech pathologist was suggested as a component of the management plan for falls prevention.

## Discussion

This review is the first to examine hospital falls prevention policy, and related policy documents, in relation to patients with communication disability. The lack of consideration of communication disability in falls risk assessment or screening tools is accompanied by lack of guidance to: (i) refer to multidisciplinary team members to support better communication (i.e., speech pathologists) and; (b) a lack of guidance for staff to adapt their communication and improve the accessibility of falls prevention programs (Hemsley et al., 2013).

The assessment tools included in this review include consideration of well-established patient risk factors for falls in hospital (Australian Commission on Safety and Quality in Healthcare, 2009). However, there is evidence that communication disability is associated with an increased risk of falls in hospital, and there is no doubt that communication disability impacts on a patients ability to engage with known falls

prevention strategies such as following safety instructions, using the call bell successfully, and effectively communicating needs (e.g., toilet, thirst, hunger) (Sullivan et al., 2020; Sullivan, Hemsley, Harding, Skinner, et al., 2023; Sullivan & Harding, 2019; Sze et al., 2001). The results of this review show that where communication factors were included in the risk assessment tools, these were subsumed into categories relating to cognition however, communication and cognition can be mutually exclusive. Conflating communication disability and cognitive impairment may provide inadequate strategies for actions taken to reduce risk of falls in patients with communication disability. Fall risk assessment should include identification of the patient's communicative limitations and functions, allowing fall prevention to be targeted towards and individualised to a patient's communication needs (Oliver et al., 2007).

The results suggest that patients with communication disability are not yet considered adequately in falls prevention strategies. Consequently, these patients are likely not taking part in the development of their falls prevention plan or participating in falls prevention education. Communication disability should not be a barrier to engaging the patient in this process, as their exclusion may not only increase their risk of falls, but also prevent empowering them to undertake the recommended prevention strategies during their hospital admission (Radecki et al., 2018). Including considerations for people with communication disability in hospital falls policies could provide useful guidance for staff to enable this population to be active participants in their falls prevention.

Speech pathologists can enhance communication between patients and healthcare providers (Blackstone et al., 2011; Bright & Reeves, 2020; Hurtig et al., 2019). Tailoring information and education to an individual's communication needs has been shown to assist patients with aphasia (language difficulty after stroke) to better

access and understand health related information (T. Rose et al., 2003). As such, increasing the focus on team members with skills in communication disability and function would be important when directing staff from a falls risk instrument into requests for a referral to a speech pathologist along with other members of the multidisciplinary team often mentioned in the policy documents and guidance.

**Limitations**

This review was limited by its methodology to include only publicly available policy documents at the state or territory and national level. Had hospitals been contacted to obtain internal documents further insights might have been obtained to the content of their falls policies. The assumption was that the publicly available documents available on health service websites would be current and patent at the time of data collection. However, the policies might have been updated since their publication, but not re-published or yet available on the website. Considering the strong alignment and saturation of content themes across all levels of document in this review, it is possible, but unlikely, that examination of additional individual hospital intranet sites at the local level would yield different or new insights into the contents of falls risk or falls prevention documents.

**Directions for Future Research**

Further research is needed to identify ways to enhance falls risk assessment tools to incorporate identification and documentation of a patient's communication disability, particularly in wards where there is a high prevalence of patients with communication disability (e.g., stroke units), particularly given evidence that it is a risk factor for falls in hospital (Hemsley et al., 2019; C.Mitchell et al., 2020). Further, a detailed investigation of the experience of hospital falls in patients with communication disability may provide further insights into the unique risk factors surrounding this

population during their hospital admission and could inform new or updated falls risk screening tools for patients with communication disabilities in hospital. Further research into the specific role of a patient's communication disability in their falls may provide guidance as to whether hospital falls-related policies and guidelines should include recommendations for adapting education for patients with communication disability in hospital (Sullivan et al., 2021; Wei et al., 2019).

## Conclusion

This content review of hospital falls policies in Australia provides important insights into how policy and guidance documents relate to the screening and assessment of falls risk and falls management for people with communication disability. The findings suggests that a patient's communication disability is not visible in hospital falls risk screening tools or prevention strategies, including education. The gaps identified in this review should be the focus of further research that deliberately includes patients with communication disability and subsequently inform priority areas for policy development.

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# Chapter 5: Methodology

## Overview of Methodology

Informed by the literature reviews, the next phase of this body of research is made up of three original studies that aimed to address the knowledge gaps highlighted by the systematic review and qualitative synthesis. The mixed research methods used in these studies draws on data from medical records, incident reports, and focus groups, analysed through the lens of the Generic Reference Model (Runciman et al., 2006). This chapter explains and justifies the research paradigm that underpinned the design of these studies, which are described in Chapters 8 – 11. This paradigm, social constructivism, is associated with a relativist ontological stance, a subjectivist epistemological position and a qualitative methodology involving the use of mixed methods and constructivist grounded theory method techniques.

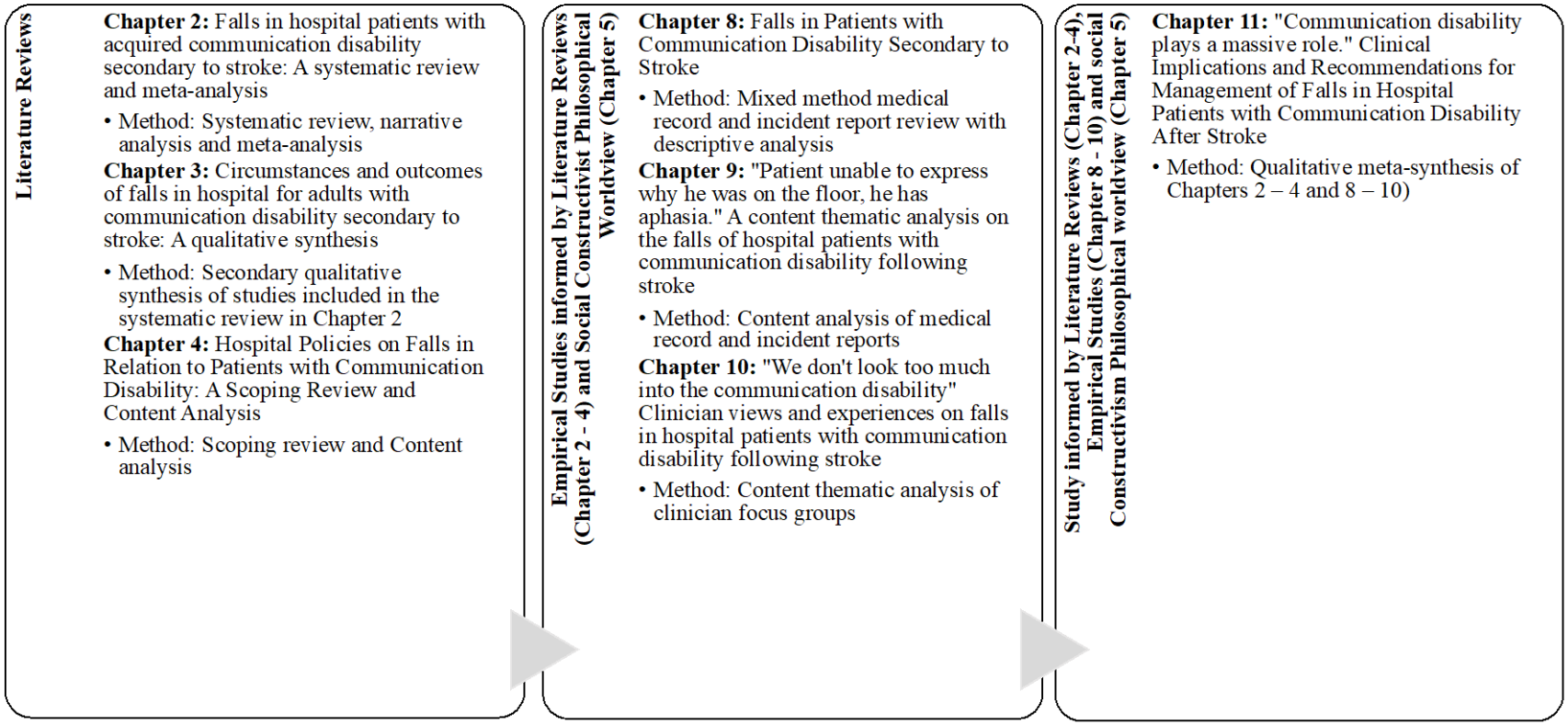
## Patient Safety Research

In comparison with studies that focus on health treatment or intervention, patient safety researchers face particular challenges in relation to controlling the events of interest, which are often rare and influenced by the complex and dynamic nature of healthcare (Runciman et al., 2008). Patient safety events are difficult to measure using quantitative approaches alone and patient safety research requires researchers to understand and engage with the context of events and dynamic hospital environment and utilise a range of data sources to identify and analyse the risks and outcomes of these events (Runciman et al., 2008). Patient safety research questions are often multifaceted and can require both qualitative and quantitative forms of examination, and mixed method designs can capitalise on the strengths of each approach and yield greater insight than either method alone (Curry & Nunez-Smith, 2017). Mixed methods research is a "type of research …[that] combines elements of qualitative and

quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration" (Johnson et al., 2007, p. 123). In this body of work, the research is underpinned by a qualitative viewpoint and the data is integrated so that the findings are complementary and provide (a) an in-depth understanding of the role of acquired communication disability in the falls of hospital patients with stroke, and (b) make an original contribution to theory development around patient safety for this population. Chapter 6 outlines methodological considerations related to the COVID-19 pandemic impacts on the research, and Chapter 7 describes the mixed methods approaches employed in Chapters 8 – 11. Figure 1 presents an overview of the relationship between the literature review chapters, the research paradigm and the studies described in Chapters 8-11.

**Figure 1**

*Overview of the Relationships between the Studies and Chapters in the Thesis*



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## Qualitative Research Paradigm

A qualitative methodology was adopted throughout this thesis because it generates understanding of the social dynamics of human behaviours in a naturalistic setting relevant to the research questions (Creswell & Creswell, 2018). Specifically, it provides insight into the nature of the human experience and the meanings individuals and groups attach to it (Leech & Onwuegbuzie, 2007), and enables deep understanding of the phenomenon under investigation (that is falls in hospital patients with communication disability following stroke) (Foley & Timonen, 2015; Queiros et al., 2017). A qualitative approach allows for multiple viewpoints to be examined, acknowledging that individual perspectives are shaped by a person's experiences and the environment (Creswell & Creswell, 2018). In addition, knowledge is viewed as being "filtered through the lenses of language, gender, social class, race, and ethnicity" (Denzin & Lincoln, 2005, p. 21); in other words, knowledge is value laden (Levers, 2013). Qualitative methodology enables a researcher to generate a comprehensive, in-depth understanding of people's lived experiences, through a process of inductive reasoning and interpretive analysis (Denzin & Lincoln, 2000). A qualitative approach was used as a means of shedding new light on the factors associated with the occurrence of falls among patients with communication disability following stroke. This approach is especially relevant, given (a) the heterogeneity of the study population, and (b) the complexity of both the hospital environment and understanding what is occurring for patients with communication disability following stroke that may influence aspects of falls management in hospital.

## Philosophical Worldviews as a Context to the Research

Qualitative research allows the researcher to bring their own world view to shape the direction of the research, using the literature to inform the focus of the

research (Creswell & Creswell, 2018). Philosophical worldviews influence the practice of research, and individuals develop their worldviews based on a range of factors and influences including their professional discipline, research communities, mentors, advisors, and experiences (Creswell & Creswell, 2018).

In this body of work, my worldview was shaped by nearly 20 years' clinical experience as a speech pathologist in Australian hospitals; in particular my work with patients with communication disability following stroke in inpatient rehabilitation wards. Through this clinical experience, I worked with patients with communication disability following stroke who experienced falls during their inpatient rehabilitation stay, and I observed that health professionals paid little attention to communication disability when discussing falls prevention strategies or during post-fall reviews. Following a sentinel event involving the death of a patient with communication disability following stroke, I completed a retrospective cohort study to determine whether patients with severe communication disability following stroke had a higher incidence of falls. This study demonstrated that there was a positive association, and the results of this study were published in Topics in Stroke Rehabilitation in 2019 (Sullivan & Harding, 2019) and presented at the Speech Pathology Australia National Conference in Adelaide Australia.

**Philosophical Approach to the Research**

The philosophical approach to this research is outlined in table 1 and further discussed below. The methods employed in this body of work are outlined in Chapter 7 and in each individual results Chapter.

**Table 1**

*Theoretical and Research Design Elements*

Falls in hospital patients with communication disability.

| Theoretical Elements | Research Study Design Elements |
|---|---|
| Paradigm | Social Constructivism |
| Ontological Position | Relativism |
| Epistemology Position | Subjectivist |
| Theoretical Lens | Generic Reference Model of Patient Safety (Runciman et al., 2006) |
| Methodology | Constructivist grounded theory methods |
| Reasoning approach | Inductive reasoning |
| Methods | Mixed methods |

### *Social Constructivism*

According to the social constructivist paradigm, individuals seek to understand the world in which they live and work, and develop meanings of their experiences (Charmaz, 2014; Creswell & Creswell, 2018; Denzin & Lincoln, 2000). The 'truth' of an experience is then a matter of shared meanings and consensus among a group of people (Patton, 2014).

### *Ontology and Epistemology*

According to Crotty (1998), ontology is the "study of being" (p. 10) and is concerned with what constitutes reality; is the world something that is constructed through our thoughts and experiences, or does it exist independently of our minds? Epistemology is a philosophical understanding of what kind of knowledge is possible, "a way of understanding and explaining how we know what we know" (Crotty, 1998, p. 3). Logically, ontological, and epistemological issues become salient together, as ontological beliefs tend to constrain epistemological beliefs (Crotty, 1998; Levers, 2013) and there are a range of ontological and epistemological positions. Social constructivism is ontologically relative and epistemologically subjective. Within this paradigm, there are multiple valid views of reality, since knowledge is generated by people and exists within their perspectives. Each view of experience is valid, and the meaning of the experience is constructed by people as they engage with the world

(Creswell & Creswell, 2018; Crotty, 1998). The goal of research undertaken within this paradigm is to document participants' views of the situation being studied and make sense of the meanings they attach to it (Creswell & Creswell, 2018). Within this paradigm, my background and culture shapes the way in which they view the world and influences the interpretation of the data (Creswell & Creswell, 2018; Crotty, 1998). Accordingly, researchers must acknowledge their own stance and interpretations of the meaning of the data whilst maintaining trustworthiness and acceptability of the results.

**Theoretical Lens**

The Generic Reference Model of patient safety (Runciman et al., 2006) was used throughout this research as a theoretically sound means of collecting, analysing and synthesising information about falls in hospital patients with communication disability following stroke. In the review of the literature described in Chapter 3, the model provided the theoretical framework for the analysis of data within the included studies. In the study of medical records and incident reports presented in Chapters 8 and 9, the Generic Reference Model was again used to provide an evidence-based framework for data collection and analysis, and a theoretically sound means of synthesising findings and identifying content themes. Further, in Chapter 12 the Generic Reference Model was used to synthesise and present the discussion.

**Methodology**

Constructivist grounded theory methodology consists of "systematic, yet flexible guidelines for collecting and analysing qualitative data" (Charmaz, 2014, p. 1). The results of research that uses grounded theory methods are discussed as a set of interrelated concepts and reported as an explanation of the phenomenon under investigation, which is falls in hospital patients with communication disability following stroke (Chun Tie et al., 2019). The explanation emerges by coding data with

themes and concepts and identifying relationships between concepts (Foley & Timonen, 2015). Constructivist grounded theory method allows the researcher's past experiences to be acknowledged in relation to the interpretation of data and how the data is coded into themes and concepts (Charmaz 2014).

Constructivist grounded theory method is often used when little is known about a phenomenon and is a commonly used in qualitative health research (Chun Tie et al., 2019; Foley & Timonen, 2015). As discussed earlier, patients with communication disability are often excluded from falls research. Whilst there is some evidence that this population is at an increased risk for falls (Hemsley et al., 2019; Salamon et al., 2012; Sinanovic et al., 2012; Sullivan & Harding, 2019; Sze et al., 2001; Tsur & Segal, 2010), the evidence for associations between falls and communication disability is mixed (Sullivan et al., 2020). Furthermore, the reasons for any increased risk and differences in experiences for patients with different degrees of disability have not been explored (Hemsley et al., 2019). Hence, constructivist grounded theory was considered as an appropriate methodology for better understanding the impact of communication disability on falls in hospital patients with stroke.

**Inductive Reasoning**

In relation to knowledge generation, qualitative research is well suited to the process of inductive reasoning in which specific observations are analysed to identify patterns and themes (Given, 2012; Patton, 2014). The researcher does not begin with a hypothesis about what the main patterns and themes will be but rather allows them to emerge from the data. By purposely seeking data from rich sources, the researcher can able to establish regular patterns in the data. In doing so, the facts of the falls are observed, analysed, and compared without a hypothesis, with generalisations drawn. In

this body of work, the data were analysed using inductive reasoning, constructivist grounded theory methodology and a relative ontological position.

While qualitative research methods can provide insights into causes and contexts of patient safety incidents, quantitative methods are able to generate numerical information about such incidents (Runciman et al., 2008). Both kinds of data are relevant to understanding safety incidents that occur in the context of the complex and dynamic hospital system (Runciman et al., 2008). Accordingly, this body of work adopted a mixed methods approach in which both qualitative and quantitative data were collected and analysed. A mixed methods design allows the researchers to use multiple data sources, which are collected simultaneously or sequentially and analysed independently to provide a detailed explanation of the phenomenon under investigation – in this case, falls in hospital patients with communication disability following stroke (Creswell & Creswell, 2018; Runciman et al., 2008). The specific methods are described in detail in Chapter 7.

## Rigour in Qualitative Research: Credibility, Transferability, Dependability, and Confirmability

In any research, it is vital to establish criteria on which its quality can be assessed. In qualitative research, four key criteria are generally identified: credibility, transferability, dependability, and confirmability (Given 2012). Each of these is elaborated below.

### *Credibility*

Credibility refers to the degree of congruence between the participants' experiences and the researcher's interpretation of these (Given, 2012). There are several techniques for establishing credibility in qualitative research, including prolonged

engagement, member checking and triangulation (Given, 2012; Nowell et al., 2017). This section describes how these procedures were deployed in the current research.

Prolonged engagement was achieved through several methodological stages. A thorough review of prior research helped to establish what was known about the topic and identify gaps in understanding. Documentary evidence was then collected in the form of hospital medical records and incident reports across eight years. Member checking was employed as a means of seeking verification during focus groups with health professionals. In this process, a summary of the themes that were identified from analysis of each focus group was prepared, the themes from each group combined and this consolidated report was sent to participants for confirmation. Credibility was further enhanced using multiple methods of triangulation, namely: methodological, investigator, data source and perspective triangulation (Patton, 2014). These are further summarised in Table 2 and elaborated in the individual Chapters 8 – 10.

**Table 2**

*Descriptions of Triangulation in this Research*

| **Triangulation** | **Description** |
|---|---|
| Method | Use of multiple methods of data collection to collate data about the same phenomenon |
| Investigator | Participation of two or more researchers in the study to provide multiple observation and conclusions to bring confirmation of findings from different perspectives |
| Data source | Collection of data from different types of people to gain multiple perspectives and data validation |
| Theory/Perspective | Researchers approach data with different perspectives and theories to interpret the data |

**Methodological Triangulation.** Methodological triangulation involves the use of different methods of data collection. In this body of work, data were collected using a combination of document data and focus groups, as described in detail in Chapters 8-10. In addition, both quantitative (Chapter 8) and qualitative data collection methods were

employed (Chapters 9, 10). This provided a more comprehensive picture of the role of communication disability in the falls of hospital patients with communication disability following stroke.

**Investigator Triangulation.** Investigator triangulation refers to the use of multiple investigators at stages during the research process. In this body of work, this occurred during data analysis, when data from medical records and incident reports and focus studies were read and re-read by myself and members of the supervisory team and discussed iteratively to inform the analysis and ensure multiple viewpoints were considered.

**Data Source Triangulation.** Data source triangulation involves the use of multiple data sources to capture different perspectives on the phenomenon under investigation. In this body of work, documentary data were obtained from the medical records and patient safety incident reports. As discussed, Chapters 8 and 9, these documents were authored by health professionals including medical doctors, nurses, and allied health professionals (e.g., speech pathologists, physiotherapists, and occupational therapists) thereby reflecting a wide range of disciplinary standpoints. Similarly, the focus groups reported in Chapter 10 included a range of health professionals in discussion.

**Theory/Perspective Triangulation.** Theory or perspective triangulation enables different viewpoints on the interpretation of data to be taken into consideration. In this context, the research team represented a range of disciplinary perspectives and professional experience. I have extensive experience working in hospital settings with patients with communication disability following stroke as a speech pathologist as well as extensive knowledge of the context of the health service where the research is taking place as an employee. All members of the supervisory team have experience working in

hospital settings with patients with stroke; Professor Hemsley as a speech pathologist, Professor Harding as an occupational therapist, and Dr Skinner as a physiotherapist. All members of the research team had access to the raw data from each of the studies and participated in discussions of the results.

### *Transferability*

Transferability refers to the extent to which the results of a study can be applied to other contexts and situations. When considering transferability in qualitative studies, researchers should focus on: (a) how closely the participants are linked to the context being studied, and (b) the contextual boundaries of the findings (Given, 2012). Two strategies are used in qualitative research to increase the transferability of the findings: critical case, purposeful sampling of participants to increase their broader relevance, and richly detailed or 'thick' description of the context, participants, and research design. The purpose is to provide readers with enough detail about the participants and context of the research to enable them to determine if the findings yield insights that can be applied to their setting (Given, 2012).

**Critical case, purposeful sampling.** Critical case purposeful sampling is a technique widely used in qualitative research and is the most effective use of limited resources (Palinkas et al., 2015). The power and logic of purposeful sampling lies in the selection of a limited number of information rich cases for in depth study (Emmel, 2014; Patton, 2014). Critical cases are selected to yield maximum insight into the phenomenon of interest (Leech & Onwuegbuzie, 2007). The critical case strategy allows for logical generalisation "if it happens there, it will happen anywhere" (Patton, 2014, p. 236). In this body of work, medical records and incident reports were purposefully selected as data sources pertaining to falls of a particular patient group (those with communication disability following left hemisphere stroke). The healthcare

staff recruited to participate in focus group discussions had provided care for these patients, thereby enriching the data set with in-depth understandings from the lived experiences of staff (Alasuutari et al., 2008; Patton, 2014). Thus, both documentary and focus group studies are likely to reflect the typical clinical presentation of subacute hospital patients with communication disability following stroke. The results of these studies are likely to be important and applicable across similar health services providing subacute services to similar patients.

**Details of context, participants, and research design.** 'Thick' description of involves providing a richly detailed account of the context, participants and research design. Each of the studies reported in this thesis (see Chapters 8, 9, and 10) contains descriptions of the setting at the centre of the investigation, including the services provided, the definition of falls used, and the standard falls prevention strategies used. The description also included details of the speech pathology assessment and management procedures typically adopted for patients with communication disability following stroke within the health service involved. Participant descriptions include demographic characteristics, the nature of the stroke, assessment of communication disability, and functional ability at the time of admission to the subacute ward as assessed by the Functional Independence Measure (FIM) (Linacre et al., 1994). The research methods for each study are described in each chapter. This level of detail about the research context, participants and design is provided to enable researchers and practitioners to assess the transferability of the findings to other settings.

***Dependability***

It is important in qualitative research to establish the dependability of the findings over time, since the context of the research is variable, changes over time and the results cannot be interpreted a priori (Given, 2012). Dependability is achieved by

ensuring that the methods are logical and clearly documented for the study to be replicated (transparency), and by maintaining detailed field notes (reflexivity) (Nowell et al., 2017). Each of these is examined below.

**Transparency.** Transparency in qualitative research is achieved by ensuring that all steps in the research process are clearly defined (Given, 2012). This detailed documentation allows other researchers to replicate the study and gives readers the ability to decide if the research methods were appropriate for answering the question and how any limitations may impact the implementation of the findings.

**Reflexivity.** Reflexivity relates to the acknowledgement of the researcher's role in the research process. Fieldnotes or an audit trail are crucial to any qualitative study and document the details to form the context that shape the data points into meaningful research findings (Given, 2012). These fieldnotes document the process used to collect, analyse and report the data in detail and included my perspective as a speech pathologist with extensive clinical experience working with patients with communication disability following stroke. These field notes provide sufficient detail to enable another researcher to follow the steps used during the research, and understanding my perspective and situation, arrive at the same or comparable (but not contradictory) conclusions (Nowell et al., 2017). Reflexivity accounts for the fact that the researcher's presence potentially influences on the research findings (Given, 2012). In this body of work, fieldnotes recording in the form of memos during data collection and analysis stages. These enabled me to reflect on the influence of my assumptions, beliefs, and attitudes during all stages of data collection and analysis, and for the supervisory team to examine during data analysis.

***Confirmability***

Falls in hospital patients with communication disability.

In qualitative research, the researcher analyses and interprets the experiences of participants within a given context, through coding (Given, 2012). During the coding process, the researcher looks for unique categories of meaning across the data that are relevant to answering the research question. Confirmability is achieved by providing evidence that: the researcher's interpretations of the participants' experience are grounded in the data; the results are verified as an accurate reflection of that experience; and the researcher has accounted for any biases (Given, 2012). Further, confirmability requires that the researcher accounts for bias by acknowledging them and using appropriate methodological practices.

In this research, confirmability was achieved through a number of strategies, which are discussed in more detail in each chapter. To increase confirmability in relation to data extraction from documents in the medical records and incident reports, standardised extraction forms and a manual were used to ensure consistency, accuracy, and reliability of the data collection. The accuracy of my first 10 transcriptions from the medical records was checked by a supervisor (Professor Harding). At the completion of data collection, an additional random sample of 10 transcriptions was checked by a research assistant, a speech pathologist with qualitative research experience who worked within the health network.

In addition, the constant comparison method of data analysis was used across the studies. Constant comparison provides researchers with a set of analytic tools to understand the multiple meanings that emerge from the data; a systematic process for identifying patters and relationships within the data, which allows for the construction of themes (Charmaz, 2014; Lyons et al., 2022). This comparison occurred at multiple levels of analysis: (a) comparing statements from the same participant, or within the same focus group; (b) comparing data collected from early participants with data

collected from later participants to identify similarities and differences; (c) comparing different concepts to form categories; and (d) comparing different concepts to understand how they relate to each other.

Any pre-existing views either I or my supervisors held were acknowledged and managed throughout data collection and analysis through discussion of: (a) the coding over several versions, (b) alternative explanations from multidisciplinary standpoints reflecting both mine and my supervisors professional expertise, and (c) verification of themes and relationships. Finally, verbatim quotes and excerpts of the raw data were used to support the interpretations of the data I made in Chapters 9 and 10.

Falls in hospital patients with communication disability.

# Chapter 6: Responding to the Impacts of COVID-19

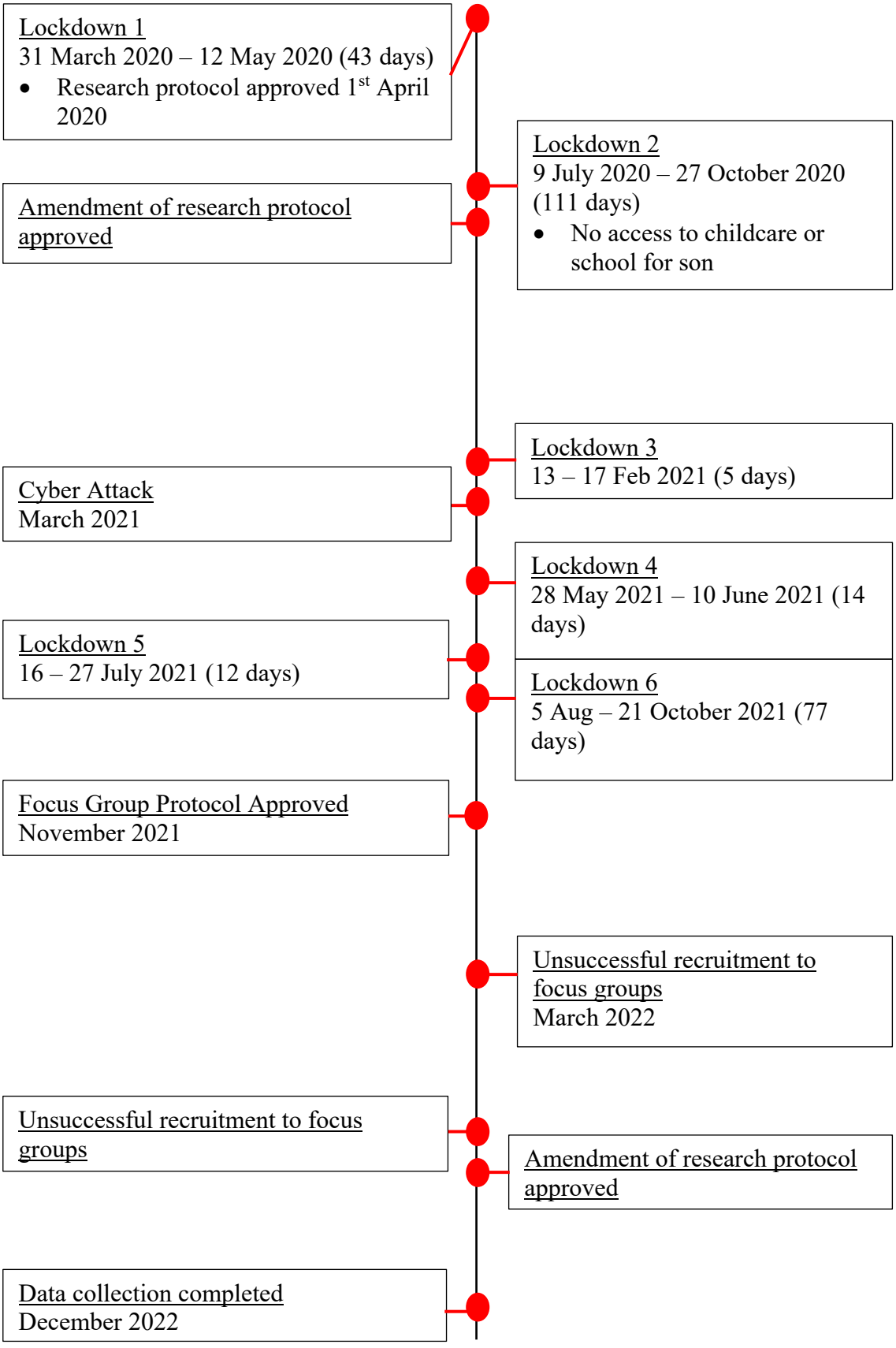
## The COVID-19 pandemic begins

In late 2019, an outbreak of severe acute respiratory syndrome coronavirus infection (COVID-19) occurred in China. The first case of COVID-19 was detected in Australia in late January 2020 and on 11 March 2020, the World Health Organisation declared COVID-19 a pandemic (World Health Organisation, n.d.). The populations most vulnerable to COVID-19 are now known to be those with underlying health conditions including those in hospital, where this research was to be undertaken (Meagher et al., 2020). Patients receiving treatment in hospital are particularly vulnerable to the transmission of COVID-19 and may be critically at risk if exposed (Eastern Health, 2020b). Accordingly, in March 2020, the Victorian Chief Health Officer restricted access to hospital to assist in providing protection from COVID-19 to people with chronic medical conditions and/or low immunity from infection.

This chapter, written in the first person, describes how this thesis was impacted by the COVID-19 pandemic, particularly the subsequent lockdowns in Melbourne, Victoria (Australia). While a range of restrictions were applied through the pandemic, the most significant were implemented during Stage 4 lockdowns, when there were only four reasons to leave your home, these being: (a) to seek medical treatment; (b) to attend essential, authorised work or education; (c) care and care giving, and; (d) shopping for essential items. The timeline shown in Figure 1 summaries the key impacts of the pandemic on the thesis and me personally.

**Figure 1**

*Timeline of Impacts from the COVID-19 Pandemic on the research.*



Falls in hospital patients with communication disability.

**Pre COVID-19 Research Protocol**

The introduction of restrictions on access to hospital populations, and on face-to-face research had a significant impact to the design of this study. The original protocol for this study, which involved an ethnographic mixed method research with three data sources, was approved by the Eastern Health Human Research Committee on 1 April 2020. The proposed data sources were:

1: Interviews with: (a) patients (n=20) with communication disability secondary to left hemisphere stroke who had experienced a fall or near miss fall during their hospital stay; (b) if available, a witness to the fall or near miss fall (n= up to 20); and (c) up to two people who were familiar with the care needs of the patient including either a family member, staff member, or both who could provide insights into the fall or near miss fall.

2: Documentation for each of the participating patients, namely: information related to the fall contained in the patient's medical record and incident report of the fall.

3: Ethnographic observations on the ward, involving observations of each of the participating patients on three occasions (during the morning routine; during a therapeutic interaction; and during a two-hour non-therapy period).

**Impact of Stage Four Lockdowns in Melbourne, Victoria on this research**

Over the course of the COVID-19 pandemic, metropolitan Melbourne endured six lockdowns, for a cumulative total of 264 days. The first Stage Four lockdown occurred just prior to ethical approval being received and the research team adopted a wait-and-see approach to data collection while completing the literature reviews.

With the second wave of COVID-19, Melbourne entered its longest period of lockdown, 111 days. As a result of the restrictions imposed in Victoria, Australia, the

health service in which the proposed research was to be conducted, focused on providing a COVID Safe Health Service that prioritised protecting vulnerable patients who could not choose to practise social distancing themselves (Byrd et al., 2020). This included a directive that only essential staff would be attending to patients. At the same time, Meagher et al. (2020) recommended that research that was expected to provide moderate-high impact, such as the development of life-saving medication or disease modification should continue, but that research whose purpose was to advance knowledge but does not offer direct benefit (i.e., the ethically approved protocol) should be paused. The original protocol for this body of work outlined above, required time in close contact with vulnerable patients and did not seek to generate direct benefit, therefore undermined both the critical public health measure of social distancing (Byrd et al., 2020).

During the second lockdown, given the expectation of extensive and ongoing delays, I approached the associated Ethics Committee, who advised that they were unsure when data collection as proposed would be able to commence. Following this, I discussed alternative data collection methods with my supervisors. Having considered a range of options, including of taking leave of absence in the hope of future easing of lockdowns restriction, or abandoning field research, I ultimately decided modify the protocol so I could continue to seek an answer to the question and, potentially, improve the care of hospital patients with communication disability following stroke hospitals - a population I had been working with for over 15 years.

### *Amendments to Research Protocol*

The amended protocol, which continued to address the research question and posed no risk to participants, was approved by the Eastern Health Ethics Committee in August 2020. As a result, the commencement of data collection was delayed by five

months. However, a further interruption occurred when Eastern Health services were subject to a cyber-attack in March 2021. This impacted the majority of IT systems, including the two that were being used to collect the medical record data in Chapter 8 and 9, and all remote access to IT systems was suspended. Coupled with varying lockdown restrictions throughout that time that prevented me from physically attending an Eastern Health site, I was unable to collect data for a period of approximately 10 weeks.

Pleased to have made the decision early to amend the data collection, I completed data collection for Chapters 8 and 9 in December 2022, while restrictions on research activities continued within Eastern Health. This shows that the decision to proceed with a modified protocol was a sound one and the findings of the study could contribute to a valuable program of research. The changes to the method continued to address the research questions as posed without any health risk to participants, and in the context of the cyberattack on Eastern Health.

**Ongoing COVID-19 Impacts on this research**

The COVID-19 pandemic also impacted recruitment to the focus groups. Although restrictions and lockdowns were no longer in place, when ethical approval to conduct the focus groups was received on 11 November 2021, the various waves of the pandemic continued to impact the delivery of health services. The intention was to recruit clinicians from two subacute wards at Eastern Health (described in Chapter 7) to participate in focus groups during work hours. An attempt to recruit participants was made in March 2022 without success.

Accordingly, an amendment to the recruitment strategy was submitted to provide for a more direct route to allied health staff via their managers. Another attempt at recruitment was made in July 2022. However, I was advised that the combined

pressures of COVID-19 and the winter Influenza season had resulted in non-clinical tasks being cancelled and staff were unable to be released to attend focus groups. As one manager reported to me: “We have been asked to cancel anything non-clinical, and have all staff client-facing wherever possible… in the current climate, it wouldn’t be appropriate/possible to have staff off the floor for focus groups” (Speech Pathology Manager, personal communication, 13th July 2022).

In view of these difficulties, and given the time pressures associated with a PhD, a further amendment was submitted to enable the focus groups to be conducted outside work hours, encompassing clinicians from across Victoria, Australia, and to use social media as a tool for recruitment. This amendment was approved August 2022, and the revised recruitment strategy was implemented between September 2022 and December 2022. In all, the impact of COVID-19 resulted in a delay of approximately six months to focus group recruitment.

This is also expanded on through an article published by this researcher and two fellow HDR candidates in Speech Pathology Australia’s ‘Speak Out’ in 2020. The reference for this article is:

Smith, R., Sullivan, R., & Turnbull, H. (2020). The COVID-19 curveball: Impacts on higher degree research students. *Speak Out,* October 2020, 32-34.

**Personal Impact of COVID-19**

Another impact of COVID-19 upon my candidature was related to my increased parental responsibilities. The Melbourne and Victorian lockdowns affected all services, including childcare and school for my son in his early years. During these lockdowns, my husband, David, and I had varying access to these supports. During the second, longest, lockdown (111 days), we had no access to childcare or kinder, meaning we were both working from home, full-time and trying to entertain a kindergarten-aged

child who was also not allowed outside to play, in our two-bedroom unit. I am quite unable to adequately describe the impact of the situation on me and my family and, consequently on my candidature, as I am not sure that it can be understood without the lived experience. We set up a desk in our bedroom. David worked from 7am until 2pm, our son had some screen time between 2pm-3pm while we both worked, then I worked until 8pm at night, for six or seven days per week. It was isolating and awful. Additionally, David's company made the decision to transition working from home as a permanent measure, leading us to sell our much-loved unit and move to a larger rental property.

I had certainly not expected to be conducting a hospital-focused PhD involving a highly vulnerable population and healthcare service providers during a global pandemic. I would definitely not recommend it! However, during the uncertainty of COVID-19 lockdowns the research gave me a focus point, a place to direct my energy and at the end of this, I take considerable pride in the fact that I was able to complete it.

Falls in hospital patients with communication disability.

# Chapter 7: Methods

The purpose of this chapter is to introduce the method for this research. The data sources are described, rationale for selection for these sources outlined, and procedures for data collection. The setting for the research is described in detail, inclusion, and exclusion criteria for selecting participants is defined, and data sources are described. A mixed methods approach was chosen to address the research questions, as patient safety incidents cannot be considered in isolation and mixed methods allowed the researchers to obtain the most comprehensive information (Runciman et al., 2008).

This research was conducted by a Certified Practicing Speech Pathologist with extensive clinical experience working with patients with communication disability following stroke through the continuum of care. The researcher also has some research experience, having conducted a retrospective cohort study as a precursor to this body of work (Sullivan & Harding, 2019). In relation to funding, the researcher was awarded a Jumbunna Postgraduate Research Scholarship and an Australian Government Research Training Program Scholarship. The researcher was employed at Eastern Health as a casual speech pathologist for the duration of the research (and previously as a speech pathologist and team leader) and therefore, following ethical approval had access to and knowledge of how the electronic medical record data base worked.

## Ethical Considerations

Ethical approval was sought and approved from Eastern Health Human Research Ethics Committee (HREC) and ratified by the University of Technology Sydney. Given the involvement of two supervisors with other universities, both La Trobe University and Charles Sturt University Ethics Committees noted the approved ethics application at their meetings.

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No identifying information about participants was provided in publications or presentations to protect their privacy. The focus groups were audio recorded for transcription and identifying information for participants or the health service was redacted during transcription.

Data security measures were taken to protect the study materials. Data was de-identified by assigning participants a code and removing information that would identify them. The data was stored on a secure network and only members of the research team had access to the data. The raw data from medical records were only accessed by members of the research team who were employed at the health service.

To minimise the risk of reputational harm to Eastern Health, information that would potentially identify the service as the study site was removed in all publications arising from this research. We also used two Eastern Health sites to avoid identifying the treating teams. There were no conditions around reporting placed on the research by Eastern Health.

**Method for Chapters 8 and 9**

Chapter 8 (Falls in patients with communication disability) and Chapter 9 ("Patient unable to express why he was on the floor, he has aphasia." A content thematic analysis of medical records and incident reports on the falls of hospital patients with communication disability following stroke) were both conducted in the same setting, drawing on the same data sources with shared inclusion criteria. Therefore, methods for these two studies are described together in the following section.

These studies were conducted at Eastern Health, Melbourne, Victoria, Australia, one of Melbourne's largest metropolitan public health services. Eastern Health provides 1.3 million episodes of care per year across seven hospitals, and delivers a wide range of services including emergency, surgical, medical, and general healthcare. Eastern

Health provides inpatient rehabilitation following stroke at six out of the seven sites in either a Subacute Rehabilitation Ward under the care of a Medical Rehabilitation Consultant or in a Geriatric Evaluation and Management (GEM) ward under the care of a geriatrician. Eastern Health does not provide acute stroke services or rehabilitation after stroke to patients under the age of 18.

The majority of patients in Eastern Health receive stroke rehabilitation under the care of a rehabilitation consultant in a Subacute Rehabilitation Ward at one of two centres (described below). These patients are able to participate in an intensive, daily therapy program. Very few patients requiring stroke rehabilitation are admitted to a GEM ward. Those who are admitted to a GEM ward are generally unable to participate in high intensity rehabilitation for a variety of reasons, including poor premorbid level of function or decreased level of alertness due to size or location of the stroke. Due to the small number of such patients, and the different models of care in the Rehabilitation and GEM wards, these studies recruited only patients in the rehabilitation setting. These settings are described below as they operated during the data collection time frame.

**Research Setting**

*Centre A* is a 176-bed facility offering emergency care, general medicine, surgery, intensive care, midwifery, paediatrics, and rehabilitation. Subacute rehabilitation is provided in three streams of care: neurology, orthopaedics and GEM. There are 32 beds in the dedicated subacute rehabilitation ward, 10 of which are specifically for patients requiring rehabilitation following neurological illness or injury. The remaining 22 beds are for patients requiring orthopaedic rehabilitation (e.g., fractures and amputation). In February 2019, the mean length of stay on this ward was 16.2 days.

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*Centre B* is a 152-bed facility providing rehabilitation, geriatric medicine, aged persons mental health, outpatient haemodialysis, residential care, and transition care. Subacute rehabilitation is offered under the same three streams of care as in Centre A, namely, neurology, orthopaedics and GEM. There are 32 beds in the dedicated subacute rehabilitation ward, 15 being specifically for patients requiring rehabilitation following neurological illness or injury. The remaining 17 beds are for patients requiring orthopaedic rehabilitation (e.g., fractures and amputations). In February 2019, the mean length of stay on this ward was 18.87 days.

Patients with stroke participate in a patient-specific, goal-directed intensive rehabilitation program including medical, nursing, and allied health (e.g., dietetics, physiotherapy, psychology, occupational therapy, and speech pathology) services with a similar model of care provided across both wards. Patients are placed in either single or shared rooms (up to four beds per room) and attend therapy sessions in dedicated spaces (e.g., a gymnasium, patient kitchen area) and in their bedroom.

Patients are transferred from acute wards to the geographic site closest to their home. Occasionally, a patient will have a specific medical requirement that affects the site to which they are transferred. For example, Centre A is co-located with acute care services with 7 day per week imaging services, while hydrotherapy and haemodialysis are only available at Centre B.

**Falls Assessment and Prevention at Eastern Health**

The Eastern Health Falls Prevention Policy (2020a) defines falls as:

> An event, which results in a person coming to rest inadvertently on the ground or floor or other lower level. This includes slips, trips, falling into other people, being lowered, loss of balance and legs giving way. If a patient is found on the floor it should be assumed that they have fallen unless they are cognitively intact

> and indicate that they put themselves there on purpose. [Falls include] if a patient rolls from a bed which has been lowered to the floor onto a crash mat/other surface that is at a lower level than the height of the bed. [Falls do not include] if a patient rolls from a bed which has been lowered to the floor onto a crash mat/other surface that is at the same level as the height of the bed.

All patients admitted to subacute rehabilitation are assessed by nursing staff for falls risk on admission to the ward. Patients falls risk is then reassessed weekly, or immediately following a fall. Until 2020, the Ontario Modified Stratify (Sydney Scoring) tool (Papaioannou et al., 2004) was utilised for this screening purpose. The Ontario Modified Stratify tool assesses a patient's history of falls, mental status, vision, and toileting needs on a binary 'yes' or 'no' scale, and transfer and mobility ability on a 0–3 numerical scale. The scores are added to together to indicate level of risk from low (scores 0-5) to high (scores 6-30) of falls. Since 2020, the Integrated Risk Assessment Tool has been utilised to assess the falls risk of patients in subacute rehabilitation wards, including those with communication disability following stroke. This tool assesses a range of risks, including cognition, pressure injuries, continence, nutrition, and falls. In relation to falls, the tool specifically assesses a patient's continence, falls history, balance, level of assistance for mobility and transfers, medications and visual impairment using a tick box. In addition to the use of these tools, patient-specific falls risk is also identified through clinical judgement during physiotherapy and occupational therapy initial assessment.

Following assessment, a range of standard falls prevention strategies are documented in the medical record and presumably implemented. A falls risk alert sign, intended to indicate to staff the level of risk of falls (i.e., high or low), is placed above

the patient's bed. Based on individual needs, a patient may also have a bed/chair or motion sensor alarm, a floor line bed, and supervision in the bathroom and toilet. In addition, the functional mobility of patients (including their ability to move on the bed, transfer from bed to chair and walk) is documented by nursing staff or a physiotherapist and outlined on an above-bed sign intended for ease of access to staff information (Eastern Health, 2020a). Each patient is also provided with a call bell, presumably placed within reach, based on consideration of any physical difficulties (e.g., hemiplegia, hemianopia). Patients who are unable to use the call bell, they may be offered suitable alternatives if appropriate (i.e., if the patient is able to use these to attract attention). When in their rooms, patients are meant to have their mobility aid, a drink, and other personal items within their reach (Eastern Health, 2020a), further nursing staff interact with patients at least hourly during the patients waking hours Eastern Health, 2021)

**Data Sources**

Documents can be used as a major form of data for a variety of purposes in qualitative research. Documents that are created by participants in the setting are assumed to reflect their perception of 'facts' and therefore can be considered a 'stable', objective form of data (Bowen 2009; Charmaz, 2014). In relation to patient safety research, an analysis of medical records provides valuable data on the nature, incidence, and impacts of adverse events and can provide rich information on causes of adverse events and methods of prevention (Blais et al., 2008; Madden et al., 2018; Rafter et al., 2015; World Health Organisation, 2003). Medical record reviews have been widely used within healthcare settings to identify any improvements and help prevent future harm (De Vries et al., 2008; Madden et al., 2018).

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The data sources for Chapter 8 and 9 were medical record and incident reports obtained from Eastern Health, which were created by hospital staff and provided valuable insights into the context of the subacute ward environment. The procedures for documentary data collection and analysis are described below. **Participants Selection and Recruitment**

Utilising the diagnostic code DSS8638 (stroke), medical record numbers were provided by Eastern Health's Decision Support for admissions (episodes of care) to either of the inpatient wards described above between 1 July 2015 and 30 June, 2020. Medical record numbers of patients meeting this diagnostic code criteria from July, 2013 to June, 2015 were obtained from a previous study (Sullivan & Harding 2019) and added to the spreadsheet, providing a total of seven years (1 July, 2013 – 30 June, 2020) of patient admissions to screen for eligibility for study. Medical record numbers were used to locate the target admission in the organisation's medical record database retrospectively and each patient's medical record was then reviewed to determine eligibility for inclusion in the research. In addition, all patients with stroke admitted to the subacute wards during the 12 months between 1 September, 2020 and 31 August, 2021 were prospectively followed throughout their admission. The patient management was reviewed three times per week between the target dates to track new admissions to determine their eligibility for inclusion; eligible patients were then monitored for a fall during their admission. Thus, a total of eight years of medical records was available for examination.

***Inclusion and Exclusion Criteria***

The *inclusion criteria* for participants were applied in the following order:

- Hospital patients, over the age of 18 with left hemisphere stroke confirmed via Computed Tomography (CT) or Magnetic Resonance Imaging (MRI),

- Having mild, moderate, severe, or profound acquired communication disability as a result of left hemisphere stroke, diagnosed by a speech pathologist; and
- Experienced a fall or near miss fall as defined by "an event which results in a person coming to rest inadvertently on the ground, floor or other lower level" (World Health Organisation, 2021, p. 3). A roll from a floor line bed to a crash mat was considered a fall within this research because the crash mat was considered to be a protective factor against injury. Near miss falls were defined as an averted fall based on the WHO's definition of a near miss, namely "an error that has the potential to cause an adverse event [patient harm] but fails to do so because of chance or because it is intercepted" (World Health Organisation, 2005, p. 8).

The *exclusion criteria* were:

- Patients with a suspected stroke that was not confirmed by imaging, and those with right hemisphere; bilateral hemisphere or intraventricular stroke were excluded; and
- Patients with significant cognitive impairments impacting on communication (e.g., dementia) and those with pre-existing communication disability (e.g., a prior stroke) were excluded.

Excluding these patients from the cohort reduced heterogeneity in the sample, which was already affected by the diversity of characteristics of patients with left hemisphere stroke and the differing impacts of aphasia, dysarthria, and dyspraxia.

**Data collection**

Following the screening of process, falls incident reports for included participants were obtained from the health service. The medical record numbers were used to match the patients' medical record and incident reports, after which each

participant was assigned a participant number, and the records were de-identified. Cases in which participants experienced multiple admissions to subacute rehabilitation, without a break in hospitalisation, were considered as one admission and data were combined. For example, where a patient was admitted to rehabilitation, then transferred to acute services for management of an acute medical issue, (such as treatment of pulmonary effusion), and subsequently returned to rehabilitation this was treated as one admission and data were collected continuously.

The data for Chapters 8 and 9 were collected simultaneously utilising a data extraction Excel spreadsheet, and bespoke Word document template. The nature of the data collected from the medical records and incident report is shown in Table 1. Categorical data were transcribed into the Excel spreadsheet; uncategorised data were transcribed verbatim into the Word document. To add confidence to the findings, the data collected from the first 10 participants were reviewed for usability and relevance by one of the researcher's supervisors' who had access to the data via their employment at Eastern Health to add confidence in the findings. Further, at the end of data collection, the accuracy of the data for a random sample of 10 participants was confirmed by a research assistant, a speech pathologist employed by Eastern Health, who was not associated with the study.

**Table 1**

*Data Collected from Medical Records and Incident Reports*

| Category of Data | Specifics |
|---|---|
| Demographics | Gender/Age[a]<br>Past Medical History[b]<br>Social History[a]<br>Languages other than English[a]<br>Stroke type and location[a]<br>Length of Stay in subacute rehabilitation[a] |
| Functional Independence Measure Scores on Admission | Total score[a]<br>Individual scores for each domain[a] |
| Communication disability | Type[a]<br>Severity[a]<br>Functional implications[b]<br>Assessment tool[b]<br>What is documented about communication disability in the closest entry to the fall by any member of staff[b] |
| Functional ability at the time of the fall | Mobility (i.e., level of assistance required for bed mobility, transfers, and mobilisation)[a]<br>Cognition (any documentation pertaining to cognition e.g., impulsive)[a]<br>Communication disability type and severity[a,b] |
| Fall information | Date of fall[a]<br>Day of admission of falls[a]<br>Injury sustained[a,b]<br>Location of fall[a, b]<br>Circumstances of fall[a, b]<br>Time of fall[a]<br>How the patient was discovered (e.g., witnessed fall or found on the floor)[a, b]<br>Falls prevention strategies documented[a, b]<br>Changes to falls prevention strategies following a fall[a, b]<br>What is documented in the 24 hours prior to a fall by any member of staff[b]<br>What is documented in the 72 hours after a fall by any member of staff[b] |

Legend: [a] refers to quantitative data [b] refers to qualitative data

***Data Analysis***

This section describes the data analysis methods for Chapters 8 and 9. Data were analysed using different methods for these studies to align with the aims of the study.

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**Chapter 8: Descriptive analysis of documentary data.** In this study, documentary data extracted into the bespoke Excel spreadsheet were mapped to the Generic Reference Model (Runciman et al., 2006) and analysed using descriptive statistics to examine and contextualise the falls of patients with communication disability following stroke.

Descriptive statistics are used to describe and summarise data into a logical and meaningful way (Fisher & Marshall, 2009; Vetter, 2017). They are used to describe the distribution of variables and draw inferences, not to establish causal relationships between variables. However, the results may be used to develop hypotheses (Grimes & Schulz, 2002). In this study, nominal measurement was used to sort the characteristics of patients' falls into the variables associated with the Generic Reference Model (Runciman et al., 2006) to further understand the contextual factors that surround falls in hospital patients with communication disability following stroke (Fisher & Marshall, 2009). Descriptive statistics allowed the researchers to reduce the data into a summary and make meaning from the results (Fisher & Marshall, 2009).

**Chapter 9: A content thematic analysis of documentary data.** This study utilised the same documentary data as in Chapter 8, on the proviso that it included comments relating to communication disability. Data were coded deductively, according to the factors within the Generic Reference Model (Runciman et al., 2006) then a content thematic analysis of the relevant medical records and incident reports was conducted to examine content relating to communication disability and the strategies associated with patient falls in subacute rehabilitation.

Content thematic analysis is widely used in qualitative research to analyse, organise, describe, and report themes within a data set. The document data in this study were created by healthcare professionals and assumed to reflect their perception of the

'facts' (i.e., their lived experiences) surrounding the falls of patients with communication disability following stroke (Bowen 2009; Charmaz, 2014). This analysis was chosen to analyse the document data as it can be used to identify patterns within and across data in relation to "lived experiences, views and perspectives, and behaviour and practices" (Clarke & Braun, 2017, p 297) and recognises the role of the researcher within the collection and analysis of data. The results of content thematic analysis can provide a rich, detailed and complex account of the data (Clarke & Braun, 2017; Elo & Kyngäs, 2008; Nowell et al., 2017).

The procedure involves the researcher reading and re-reading the extracted data and applying codes to the unique categories of meaning within the data. The generation of codes, allows the features of the data that are relevant to the study's aims to be captured, and as participants' data were extracted, themes were generated in a constant comparison manner (Clarke & Braun, 2017). Further, as data were analysed, the themes were refined and verified (Clarke & Braun, 2017). This method of data analysis enables the researcher to make valid inferences from the data and yield new insights and knowledge into the phenomena under investigation (Elo & Kyngäs, 2008). The Generic Reference Model (Runciman et al., 2006) guided the reporting of the results in this Chapter.

**Method for Chapter 10: A content thematic analysis of focus group data.**

***Data Source***

Chapter 10 used focus groups to provide further context and information regarding the impact of communication disability on falls risk, and prevention strategies. Focus groups of health professionals who work with patients with communication disability following stroke in hospital were conducted to explore: (a) the impact of communication disability on falls in patients with stroke; (b) falls prevention

strategies for patients with communication disability following stroke; and (c) any potential role for speech pathologists in the assessment, management and prevention of falls in this population.

Focus groups are a form of qualitative interviewing, in which the aim is to collect information about the experiences and perspectives of participants in relation to the topic under investigation (Given, 2012). Although the discussion is guided by the researcher, the participants are free to discuss the topic in their own way (Given, 2012; Patton, 2014). Focus groups are often used in the context of healthcare and medical record research to obtain knowledge and attitudes and increase confidence in the emerging results (Wong, 2008). Examining the interactions among participants can allow researchers to assess the extent to which there are consistent or shard views, and thus enhance the quality of the data (Given, 2012).

***Recruitment of Participants***

Participants were recruited via social media using purposeful and snowballing sampling techniques. Medical, nursing, and allied health clinicians who had provided clinical services to hospital patients with communication disability following stroke, in Victoria, Australia were eligible to participate. The recruitment of participants for this study is further outlined in Chapter 10.

***Data Collection and Analysis***

Online focus groups were conducted between October and December 2022 via Zoom (Zoom Video Communications, Inc., n.d.). A topic guide informed by the results of Chapters 2-4 and 8 and 9 was used to guide the discussions. The topic guide for this discussion is presented in Table 2 and further details of the data collection method are outlined in Chapter 10.

**Table 2**

*Focus Group Topic Guide*

| | |
|---|---|
| Participant role | Before we get into discussing some of the findings of the research, can you introduce yourself to the group by saying your discipline and role, and how long you have worked in that role? |
| Falls in patients with communication disability following stroke | a) When a patient with communication disability falls, what's the impact of that fall on them and on you as staff?<br>b) In your view, does the patient's communication disability play any role in the fall, or not, can you explain your views on this? |
| Falls prevention | a) What strategies help to prevent falls in patients with communication disability?<br>b) Is falls prevention education delivered to patients with communication disability? Can you describe how this happens and its impact?<br>c) What about when strategies don't work. What gets in the way of falls prevention strategies working for this group? |
| Role of speech pathology | What are your views on the role of speech pathology expanding to help prevent falls of these patients? Do you have any examples of this already happening? |
| Incident reporting | Patients with communication disability can have trouble explaining what happened when they fall. Can you give me an example of a time that you needed to write an incident report for patient with communication disability who fell, and how you worked out what happened? |

The focus group discussions were transcribed verbatim by the researcher and de-identified. The transcripts were imported into MAXQDA 2022 (VERBI Software, 2021) and analysed using content thematic analysis (Clarke & Braun, 2017; Elo & Kyngäs, 2008; Nowell et al., 2017). As described above, content thematic analysis is used in qualitative research to organise, describe, and report themes to provide a rich, detailed account of the data (Clarke & Braun, 2017). The data in this study were transcripts of focus groups health professionals who have cared for patients with communication disability following stroke who experienced a fall during their hospital admission. Content thematic analysis was chosen to analyse these transcripts to identify

patterns across these lived experiences, views, perspectives, and practices, and to verify patterns in the results of Chapters 8 and 9. Additionally, content thematic analysis recognises the role of the researcher as a speech pathologist with experience working with patients with communication disability following stroke who experience a fall during their rehabilitation admission - and the experience of the supervisory team - within the collection and analysis of data. This allows the researcher to reflect on any influence of assumptions, beliefs and attitudes shaped by my worldview on the data collection and analysis. This has been discussed further in Chapter 6 (page 106).

As explained by Bloor et al., (2012), the process involves the researcher reading and re-reading the transcript and applying codes to all relevant data, thus ensuring that all participants' views are considered. The context of individual participants' coded data is examined across the discussion as a focus group can generate new ideas, and interactions between participants can lead them to changing their views (Bloor et al., 2012). In the present study, the groups were analysed iteratively with initial codes being applied to the data within each focus group. Following this process, the codes were further developed and refined into themes through further analysis, involving comparison across the four focus group transcripts and discussion with the supervisory team. To further verify the researchers' interpretations of the data, a written summary of each focus group's themes and a summary of all the groups were emailed to participants who were invited to comment on the extent to which the summary accurately reflected the discussion in their group and to make any changes they considered necessary. Of the 11 participants across the four focus groups, one participant responded and no changes to the summaries emerged through this process.

**Chapter 11: Qualitative Meta Synthesis of Chapters 2-4 and 8-10.**

As explained by Major & Savin-Baden (2010) and Finfgeld-Connett (2018), a qualitative research synthesis is used to draw together, triangulate, and synthesise the findings of research that has generated new forms of knowledge, thereby allowing for the development of evidence-based practice and policy. As each study contributed new knowledge relating to risks, management, and potential strategies to improve patient safety for patients with communication disability following stroke, a qualitative research synthesis was used to combine and analyse the findings of the research. In this meta synthesis, the studies represent a line of argument demonstrating how the studies are tied to one another so that one study informs the next (Major & Savin-Baden, 2010).

In this study, the findings of the systematic review (Chapter 2), the qualitative synthesis (Chapter 3), the policy review (Chapter 4), the documentary data studies (Chapters 8 and 9), and the focus group study (Chapter 10) were integrated. This involved mapping the results and findings of each study, again considering the Generic Reference Model (W. B. Runciman et al., 2006) of patient safety in the framework of analysis. To this end, the researcher coded the findings and results of the studies inductively according to content categories of meaning, which were then synthesised by combining the categories of meaning over multiple iterations. By synthesising the results in this way, a model was created of the ways in which communication impacts on falls in hospital patients with communication disability following stroke and recommendations for clinical practice were made. The details of the method and data analysis are described further in Chapter 11.

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## Chapter 8: Falls in Patients with Communication Disability Secondary to Stroke

This chapter presents a descriptive analysis of data from clinical patient records (medical records and incident reports) that aims provide insights into the role of communication disability in the falls of hospital patients with acquired communication disability following left hemisphere stroke. This study described the contributing factors, circumstances, and outcomes of hospital falls in patients with communication disability following stroke and interpreted the findings using the Generic Reference Model (Runciman et al., 2006). This information may help inform the development of targeted falls prevention strategies that are inclusive of patients with communication disability following stroke.

This study was published in Clinical Nursing Research. The final published PDF is used with permission as part of a thesis as part of Sage's Archiving and Sharing Policy. This review is available online at: https://journals.sagepub.com/doi/abs/10.1177/10547738221144214. The bibliographic reference is:

Sullivan, R., Harding, K., Skinner, I., & Hemsley B. (2023) Falls in patients with communication disability secondary to stroke. *Clinical Nursing Research 32(*3), 478-489. https://doi/abs/10.1177/10547738221144214.

Clinical Nursing Research
2023, Vol. 32(3) 478–489

DOI: 10.1177/10547738221144214
journals.sagepub.com/home/cnr
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# Falls in Patients With Communication Disability Secondary to Stroke

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**Abstract**

Patients with stroke are at high risk of falls during inpatient rehabilitation admission. Communication disability is common following stroke; however, this population is often excluded from falls research. This study aimed to examine the falls of patients with communication disability following stroke, including the circumstances, contributing factors, and outcomes of the fall. This medical record review used the Generic Reference Model of patient safety as the analytical lens and data were analyzed descriptively. The study included 109 patients who experienced 308 falls. The most common type of fall was an "unwitnessed roll from bed." Patient factors contributed to half of all falls, injuries occurred in 15% of falls, and impacts to the hospital system included additional costs and staffing. Understanding the reasons why patients are attempting to get out of bed may identify ways to reduce the risk and incidence of falls in this population.

**Keywords**

falls, syndromes, clinical research areas, patient safety, stroke, diseases, communication disability

## Introduction

Inpatients with stroke are at significant increased risk of falls, with between 14% and 65% of patients with stroke falling at least once during their acute and rehabilitation hospital admission (Batchelor et al., 2012; Walsh et al., 2016). Risk factors for falls in patients with stroke are known to be multifactorial and include difficulties with balance, neglect, and requiring assistance for activities of daily living (Campbell & Matthews, 2010; Denissen et al., 2019). The increased activity of patients as they undergo therapy to regain functional independence is suggested as a contributing factor to the high fall rates in inpatient rehabilitation stroke populations (Aihara et al., 2021; Suzuki et al., 2005; Sze et al., 2001). Hospital falls potentially result in a range of serious and preventable adverse consequences to both the patient and the health service, including injury, loss of functional capacity, increased length of stay, and cost of care (Constantinou & Spencer, 2020; K. D. Hill et al., 2007; Morello et al., 2015).

It is estimated that communication disability (e.g., aphasia) affects approximately 64% of people with stroke, particularly those with left hemisphere stroke (Mitchell et al., 2020). Decreased ability to communicate with healthcare professionals can impact patient safety and the quality of care (Bartlett et al., 2008; Hemsley et al., 2013; Simmons-Mackie & Kagan, 2007; Sullivan et al., 2020). Patients with communication disability have unique factors that have the potential to contribute to falls in acute and rehabilitation hospitals, including problems communicating their basic needs (e.g., for using the toilet) and using the call bell to gain attention or assistance from staff (Hemsley et al., 2013; Sullivan & Harding, 2019; Sullivan et al., 2021). For example, patients with communication disability following stroke may engage in risk-taking behaviors such as attempting to mobilize alone due to difficulties expressing their needs (Sullivan & Harding, 2019; Sze et al., 2001) or fall due to difficulties following instructions such as those required to transfer safely (Mion et al., 1989; Sze et al., 2001; Zdobysz et al., 2005).

However, there is limited evidence available to inform health service providers about falls risk for patients with communication disorders or strategies to mitigate risk. Patients with communication disability are often excluded from falls research and where they are included, detailed

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reporting on communication disability is lacking (Hemsley et al., 2019). A recent systematic review and meta-analysis (Sullivan et al., 2020) found no association between communication disability and falls in acute or rehabilitation hospitals, but the included studies were limited by (a) failing to report on the severity of participants' communication difficulties, and (b) excluding participants with severe strokes, a population more likely to experience both communication disability and falls (Mitchell et al., 2020; Sullivan et al., 2020). Subsequently, a review of prior research aiming to identify contributing factors, hazards, and outcomes of falls for patients with communication disability following stroke found no specific research to inform falls prevention strategies and further research (Sullivan et al., 2021). With little contextual or detailed information regarding falls in patients with communication disability following stroke, it is difficult to identify ways to reduce the risk of falls for this vulnerable patient group.

The Generic Reference Model is a framework of factors impacting patient safety incidents (Runciman et al., 2006). The model can be used to understand the rich contextual factors and guide the collecting and analyzing of information in relation to falls (Runciman et al., 2006). The model is underpinned by a risk management structure and enables analysis of patient safety incidents through organization of elements of a patient safety incident into three key areas: the contributing factors and hazards, the incident details, and the outcomes and consequences for the patient and the organization. The contributing factors and hazards for a patient safety incident are grouped into five categories: (i) environmental factors; (ii) organizational factors; (iii) human factors; (iv) patient factors; and (v) medication, equipment, and documentation. The incident is then investigated in relation to the demographics of the patient, timing of the incident, and how and when the incident was detected. Incident outcomes and consequences are examined for both the patient and the organization (e.g., the health service) in relation to any patient injury, suffering, or disability, and impact on organizational resources.

Therefore, the aim of this study was to examine and contextualize the falls of patients with communication disability following stroke in rehabilitation hospital, including the circumstances leading up to and potentially contributing to the fall, the fall incident, and the outcome of the fall on both the patient and the rehabilitation hospital according to the Generic Reference Model (Runciman et al., 2006). This contextual information may help to inform the development of falls management strategies that are inclusive of this population and future research on the falls risk of patients with communication disability after stroke.

## Method

### Study Design

This mixed-methods medical record chart review study involved both retrospective and prospective review of rehabilitation hospital patient medical records and patient safety incident reports for adult patients admitted to rehabilitation wards with stroke and confirmed, documented communication disability.

### Ethics

Ethical approval for this study was obtained from the Health Service Human Research Ethics Committee and the Universities involved.

### Setting

The study took place in two rehabilitation wards, across two hospitals within one major metropolitan health network in Australia. The first author was an employee, previously working across the two wards, and the second author is employed at the health network. Each rehabilitation ward is a 32-bed facility offering both neurological and orthopedic rehabilitation under the care of a Rehabilitation Consultant (Doctor) and multidisciplinary allied health and nursing team. A similar model of care is provided across both wards, and each ward utilizes the same care policies to provide patients with stroke patient-specific, goal-directed intensive rehabilitation. Differences in models of care across the wards include: (a) access to hydrotherapy, (b) access to dialysis, and (c) access to acute hospital care in the event of a medical deterioration.

Within the health service in this study, standard falls prevention strategies include hourly nurse rounding, ensuring the call bell is in reach of the patient, and posters on the wall near the bedside indicating the patient's mobility status (i.e., assistance required for transfers, ambulation, and bed mobility). The degree of falls risk uses a traffic light system (i.e., green = low, amber = medium, red = high). Falls prevention strategies are tailored to individual patient needs and may include one or more strategies, including bed or chair alarms, a tilt-in-space wheelchair, and scheduled rest times.

### Participants

*Locating participants eligible for inclusion.* The health service provided a spreadsheet of all episodes of care (i.e., patient admissions, noting that each admission provided a new episode of care) provided to patients with stroke admitted to the subacute wards between July 2013 and June 2020. The first author listed each episode of care chronologically and matched episodes to the medical records of eligible patients.

*Eligibility.* Patients were eligible for inclusion if they were admitted following a left hemisphere stroke with associated confirmed and documented communication disability, and had a documented fall or a near miss fall during their rehabilitation hospital admission. The medical records of all patients with stroke admitted to the included wards between July 2013 and June 2020 were screened against the inclusion

criteria. In addition, all patients with stroke admitted for the 12 months between September 1, 2020 and August 31, 2021 were prospectively followed using a patient management system throughout their admission and screened against the inclusion criteria. Variables used for inclusion and exclusion were defined as follows:

*Left hemisphere stroke.* The presence of a left hemisphere ischemic or hemorrhagic stroke was confirmed through computerized tomography or magnetic resonance imaging. We excluded patients with either a right hemisphere stroke, a suspected stroke that was not confirmed by imaging, or bilateral hemisphere or intraventricular stroke to reduce heterogeneity, and focus specifically on the impairments of speech (dysarthria, dyspraxia) or language (aphasia) as a result of a left hemisphere stroke.

*Communication disability associated with the stroke admission.* Diagnosis and severity of a communication disability secondary to stroke was documented by a speech pathologist for the stroke admission following an informal or formal assessment of the patient's communication skills. This typically included notes on (a) the type and severity of the patient's communication disability; and (b) the speech pathologist's clinical opinion on whether the patient could communicate basic needs (e.g., gaining attention, toilet, hunger or thirst, pain, comfort or positioning, and nausea) through any method of communication (i.e., vocalizing, speaking, gesture, writing, or a communication board). Patients with significant cognitive impairments impacting on communication (e.g., dementia); and those with a pre-existing communication disability (e.g., readmission following a prior stroke) were excluded from this study.

*Falls and near miss falls.* Falls were defined as "an event which results in a person coming to rest inadvertently on the ground, floor or other lower level" (World Health Organisation, 2021, p. 3) and identified by medical record entry. A roll from a floor line bed to a crash mat was included as a fall, with the crash mat considered a protective factor against injury. Near miss falls were defined as an averted fall, in keeping with the definition of a near miss event: "an error that has the potential to cause an adverse event [patient harm] but fails to do so because of chance or because it is intercepted" (World Health Organisation, 2005, p. 8). Near miss falls were identified as such by a medical record entry and included (a) patients stumbling or tripping, (b) falls that were prevented by staff through adjustment of patient position, and (c) falls that were prevented by equipment such as staff placing wheelchairs behind patients who were at imminent risk of a fall.

## Data Sources: Medical Records and Incident Reports

*Medical record data.* In this setting, medical records include nursing, medical doctors, and allied health documentation; medication charts; and test results. Any handwritten medical records were scanned to form an electronic medical record. All of these records were read for any information relating to the Generic Reference Model (Runciman et al., 2006) for each of the patient falls.

*Incident report data.* Any matching incident reports created in relation to the falls were obtained from the health service by a search of the incident reporting system using the patient's medical record number.

## Data Extraction and Analysis

The participants' medical records and fall incident reports were examined and data extracted into an Excel spreadsheet to build a database relating to the Generic Reference Model (Runciman et al., 2006). Where an incident report had been made, this was matched to the participants then de-identified and text transcribed verbatim into an Excel spreadsheet. Additionally, medical record data pertaining to each participant's demographics, diagnosis of communication disability, and falls prevention strategies prior to the fall were recorded.

The Excel database therefore included data for each participant on: (a) demographics (age, gender, location of stroke, past medical history, social history, and any languages spoken other than English); (b) length of stay; (c) Functional Independence Measure (FIM) scores across all domains and total admission score as a reliable and valid measure of the participants' independence on admission; (d) type and severity of communication disability, including any assessment tools used for diagnosis; (e) the patient's functional status at the time of the fall (e.g., mobility, cognition, and communication); (f) circumstances surrounding the fall (e.g., the location of the fall, activity during the fall, and the time of day of the fall); (g) outcomes from falls (e.g., injury rates); (h) possible contributing factors for falls; and (i) falls prevention strategies in place. To aid in analysis, we categorized time in four periods according to the ward activity (1) 06:00 to 09:59 (morning), (2) 10:00 to 15:59 (day), (3) 16:00 to 19:59 (evening), and (4) 20:00 to 05:59 (overnight).

After the first author extracted data from the first 10 included participants' medical records, accuracy of transcription of relevant data (to 100% accuracy) and relevance of data collected was confirmed by the second author. Following completion of the data extraction by the first author, accuracy of data extraction of a further 10 randomly selected participants was confirmed by a research assistant, a speech pathologist with research experience who worked within the same health network from where records were drawn. Discrepancies in transcription of relevant data were discussed with the research assistant and reviewed by the first author across the total sample with changes to the data collection made as required.

Data was analyzed descriptively according to the factors within the Generic Reference Model (Runciman et al., 2006)

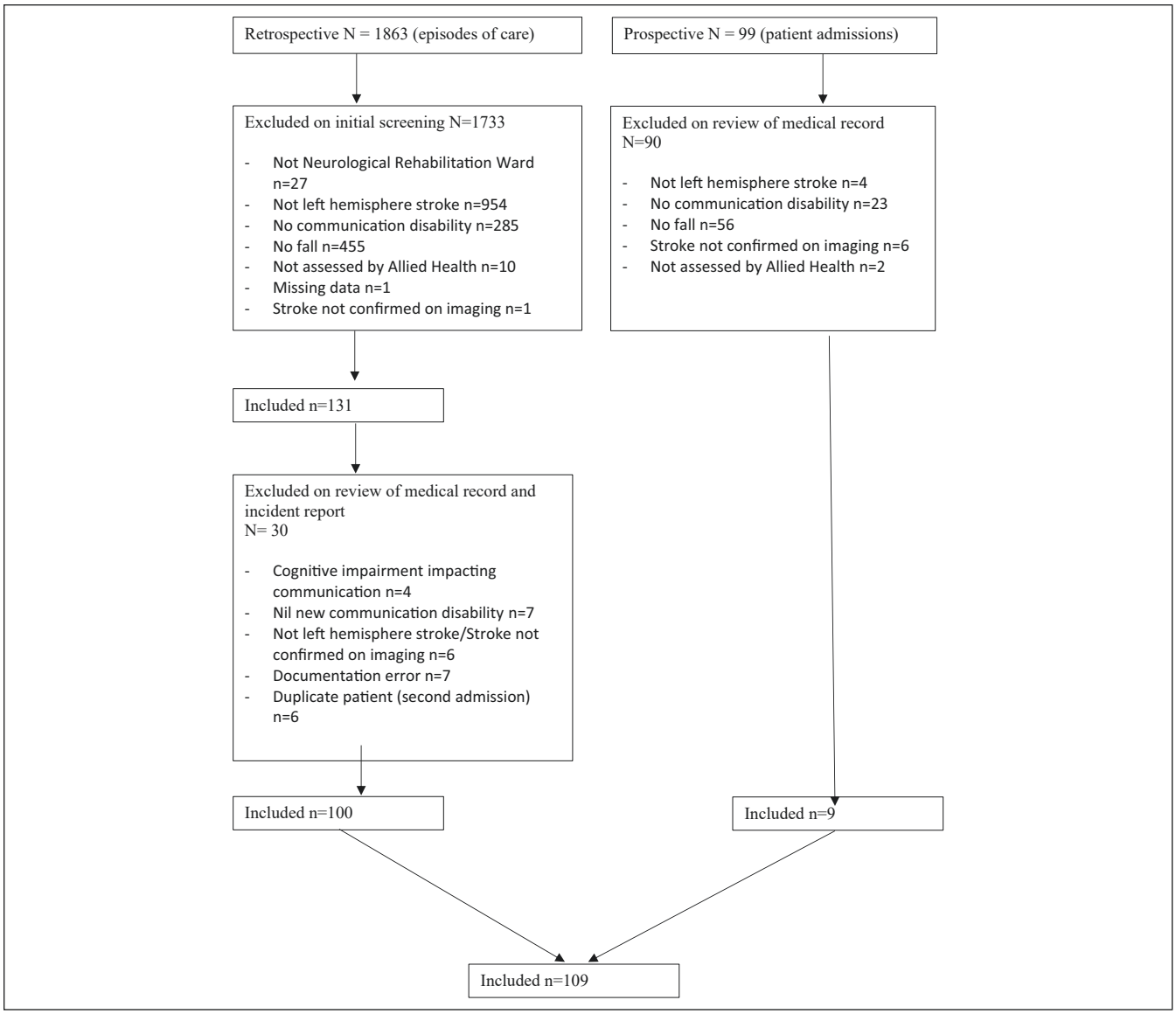


**Figure 1.** Case identification flowchart.

with each factor in the model forming a code for categorical analysis. This was done to provide a rich and detailed context for the circumstances, nature, and outcome of the falls documented.

## Results

A total of 1,863 retrospective episodes of care and 99 prospective patient admissions were screened against the eligibility criteria. Of these, there were 109 participants meeting the criteria for inclusion. The 109 participants' records described 308 falls, including 18 near miss falls (see Figure 1). Of the falls documented in the medical record, 222 had an associated incident report. Furthermore, there were 11 incident reports for falls that did not have corresponding medical record entries.

### *Participant Demographics*

The mean age of participants was 75.5 years (*SD* 10.8, range 41–94 years) with 64 men (58%). The mean length of stay in rehabilitation was 47 days and mean FIM admission score 37.6 (from a total of 126, *SD* 16.6, range 18–91). On admission, 86 of the 109 participants were non-ambulant (78.9%), 71 of the 109 (65.4%) required full assistance for self-care tasks and 76 of the 109 (69.7%) were incontinent of bladder or bowels. Over the course of an admission, the median day of a fall was day 2 of admission (range day 0–day 39) and 51 participants (47%) experienced more than one fall during their rehabilitation admission. Further participant details (characteristics of communication disability, ambulation, continence, and ability to complete activities of daily living tasks) are outlined in Table 1.

**Table 1.** Participant Demographics.

| | Mild | Moderate | Severe | Profound | Missing data | Total |
|---|---|---|---|---|---|---|
| *N* | 9 | 28 | 61 | 7 | 4 | 109 |
| Age (mean (*SD*)) | 72.1 (11.3) | 75.5 (10.2) | 75.6 (11.4) | 75.3 (11.8) | 73.7 (10.6) | 75.5 (10.8) |
| Gender (*n* (%) male) | 3 (33.3) | 17 (60.7) | 37 (60.7) | 6 (85) | 1 (25) | 64 (58.7) |
| Length of stay (days, (mean (*SD*)) | 45.3 (12.3) | 53.4 (27.7) | 43.4 (28.4) | 62.0 (48.7) | 57.4 (38.8) | 47.0 (28.6) |
| Total FIM (mean (*SD*)) | 54.2 (21.6) | 45.1 (18.4) | 33.7 (18.54) | 24.6 (8.0) | 34.5 (13.2) | 37.6 (19.3) |
| Falls per participant (median (*SD*)) | 1 (4.5) | 1 (4.5) | 1 (4.5) | 1 (6.9) | 1 (0.6) | 1 (4.5) |
| Characteristics of communication disability (*n*, %) | | | | | | |
| Aphasia | 2 (22) | 22 (78) | 58 (95) | 6 (86) | 3 (75) | 91 (83) |
| Dysarthria | 7 (88) | 5 (18) | 2 (3) | 1 (14) | 1 (25) | 16 (15) |
| Cognitive communication | 0 (0) | 1 (4) | 1 (2) | 0 (0) | 0 (0) | 2 (2) |
| Ambulation status on admission (with or without gait aid)[a] (*n*, %) | | | | | | |
| Independent | 0 (0) | 1 (4) | 4 (7) | 0 (0) | 0 (0) | 5 (5) |
| Supervision | 2 (22) | 2 (7) | 5 (8) | 0 (0) | 0 (0) | 9 (8) |
| Minimum assist | 1 (11) | 1 (4) | 5 (8) | 0 (0) | 0 (0) | 7 (6) |
| Moderate assist | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 1 (25) | 1 (1) |
| Maximum assist | 0 (0) | 0 (0) | 1 (2) | 0 (0) | 0 (0) | 1 (1) |
| Non-ambulant | 6 (67) | 24 (85) | 46 (75) | 7 (100) | 3 (75) | 86 (79) |
| Continence on admission (with or without continence aid)[b] (*n*, %) | | | | | | |
| Incontinent | 3 (33) | 25 (89) | 50 (82) | 5 (71) | 3 (75) | 86 (79) |
| Continent | 6 (67) | 3 (11) | 11 (18) | 2 (29) | 1 (25) | 23 (21) |
| Functional ADL status on admission[c] | | | | | | |
| Supervision | 0 (0) | 1 (4) | 2 (3) | 0 (0) | 0 (0) | 3 (3) |
| Minimum assist | 3 (33) | 11 (39) | 12 (20) | 0 (0) | 3 (75) | 29 (27) |
| Moderate assist | 0 (0) | 1 (4) | 2 (3) | 0 (0) | 0 (0) | 3 (3) |
| Maximum assist | 1 (11) | 0 (0) | 1 (2) | 0 (0) | 0 (0) | 2 (2) |
| Full assist | 5 (56) | 15 (53) | 43 (70) (missing data = 1) | 7 (100) | 1 (25) | 71 (65) |

*Note*. FIM = Functional Independence Measure.

[a]Supervision includes staff or family providing visual supervision for the task; minimum assistance includes staff or family providing hands on assist for ~25% of the task; moderate assist includes staff or family providing hands on assistance for ~50 of the task; maximum assist includes staff providing hands on assistance for more than 75% of the task.

[b]Participants with indwelling catheters were considered incontinent.

[c]ADL = activities of daily living; minimum assistance includes staff or family providing hands on assist for ~25% of the task; moderate assist includes staff or family providing hands on assistance for ~50 of the task; maximum assist includes staff providing hands on assistance for more than 75% of the task; full assist includes staff completing 100% of the task.

## *Participants' Communication Disabilities*

Participants' documented communication disabilities included aphasia, dysarthria, apraxia of speech, cognitive communication disability, or a combination of these disorders. On admission to rehabilitation, 9 (8.3%) participants had a mild communication disability, 28 (25.7%) had a moderate communication disability, 61 (56%) had a severe communication, and 7 (6.4%) had a profound communication disability (see Supplemental Table 1). Four participants' records lacked data on their severity of communication disability.

## *Protective/Prevention Factors Prior to First Fall*

Prior to the first fall, 52 of the participants had tailored falls prevention strategies documented in their medical record. Of these, 34 (65.4%) had multiple prevention and protection strategies, and 18 (34.6%) had a single prevention or protection strategy in place. These strategies involved the provision of equipment such as floor line beds (beds lowered to touch the floor, with the patient lying 7 to 11 cm from floor height), with or without a crash mat next to the bed, bed or chair alarms, or combinations of these strategies.

Seven of the participants (6.4%) were supported by family or visitors attending daily, staying overnight, or providing supervision when one-to-one nursing was not available. On admission, 11 of the participants (or 10%) were placed into a room with high visibility to staff specifically for falls prevention.

## *Contributing Factors and Hazards for Falls*

The contributing factors and hazards for falls reflected four categories specified in the Generic Reference Model

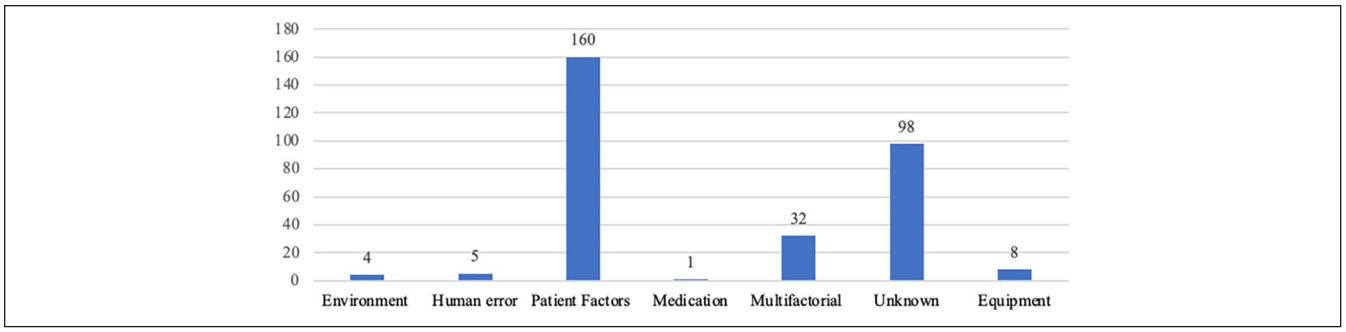


**Figure 2.** Contributing factors for falls for patients with communication disability following stroke.

(Runciman et al., 2006): (a) environment, such as clutter; (b) other human error, including incorrect transfer assistance; (c) patient factors; and (d) medication, equipment, documentation. Participants who had multiple contributing factors for falls, or where the factors were unknown, were considered separately so as to enable an in-depth appreciation of their multiple factors. Falls in each category are shown in Figure 2.

Half of the total number of falls were attributed in the documents solely to patient factors ($n=160$ or 51.9%). The individual patient factors contributing to these falls included: agitation, balance impairments (e.g., co-ordination and stability of the body), changes in medical condition, mobility impairments (e.g., ataxia), and weakness of the trunk or limbs (i.e., hemiplegia). Communication disability was documented as a direct contributing factor in 11 (3.6%) of these falls.

In nearly one-third ($n=98$ or 31.8%) of the total falls, a contributing factor was not identified and could not be coded. This often occurred when falls were described as unwitnessed and the patient with severe communication disability had been unable to describe the event. Participants who fell for unknown reasons often experienced multiple falls where a reason was unable to be identified.

Multiple contributing factors were present in only 32 (10.3%) falls. Multiple contributing factors included combinations of factors from two or more of the other categories outlined above (e.g., a patient factor such as a balance impairment, and a documentation error in respect to how the patient transferred).

Environmental factors that resulted in a fall ($n=4$, 1.3%) included clutter of equipment and spills of water on the floor. Human errors accounted for five (1.6%) of the falls, and included circumstances such as inappropriate transfers or assistance from family members and failing to provide appropriate handover of patient care (e.g., notifying staff that a patient had returned from therapy so that adequate supervision and falls protections could be put in place on return to the ward). Medication was thought to be a factor in one fall (0.32%) and equipment failure (e.g., faulty bed or chair alarm) or equipment being set up or used incorrectly (e.g., a cushion sliding from a wheelchair) was identified as a concern in relation to eight (2.6%) of the falls.

## *Circumstances of the Fall*

Circumstances of the fall were analyzed according to: (a) the circumstances of any activity being performed prior to or during the fall; (b) the location of the fall; (c) the time of day the fall occurred; (d) witnesses, if any, and; (e) how the fall was detected or reported. The circumstances of each fall are reported in Figure 3.

The most common circumstances of falls were a roll from a floor line bed to either the floor or a crash mat, accounting for almost half ($n=135$ or 44%) of the total number of falls. There were 17 (15.6%) participants who experienced multiple falls that were rolls from the bed, accounting for 117 falls. This was followed by falls during transfers (e.g., from a bed to a chair) ($n=39$, 12.6%), falls from a standard height bed ($n=29$ or 9.4%), or from a chair/wheelchair ($n=29$ or 9.4%), and falls during mobilization ($n=25$ or 8.1%). There were 22 (7.1%) falls where the circumstances were unclear, as the severity of the patient's communication disability meant they were unable to describe the event. Other circumstances of falls included during self-care ($n=2$), during therapy ($n=3$), and from a standing position ($n=5$). The circumstances of near miss falls were: (i) rolls from bed ($n=8$), (ii) during transfers ($n=5$), (iii) during mobilization ($n=3$), and (iv) during therapy ($n=1$). The circumstances of one near miss fall was not documented well enough to be coded.

The majority of falls occurred in the patient's bedroom ($n=265$ or 86%), followed by the bathroom ($n=22$ or 7%), and other areas of the rehabilitation hospital ward or therapy areas ($n=21$ or 6.8%). Slightly more falls occurred during the day ($n=76$ or 25%) and overnight periods ($n=81$ or 26%) than during the morning ($n=49$ or 16%) and evening ($n=54$ or 17.5%). There were 48 (16%) of falls that could not be assigned to a time period.

Where falls were witnessed, nursing staff were the most common witnesses, followed by other staff (e.g., physiotherapists and patient support staff) and other patients and visitors. More than half ($n=176$, 57%) of the falls were unwitnessed. In 39% of the unwitnessed falls, the patient was found on the floor by staff during activities such as rounding, cleaning, and walking past the room. Other less common

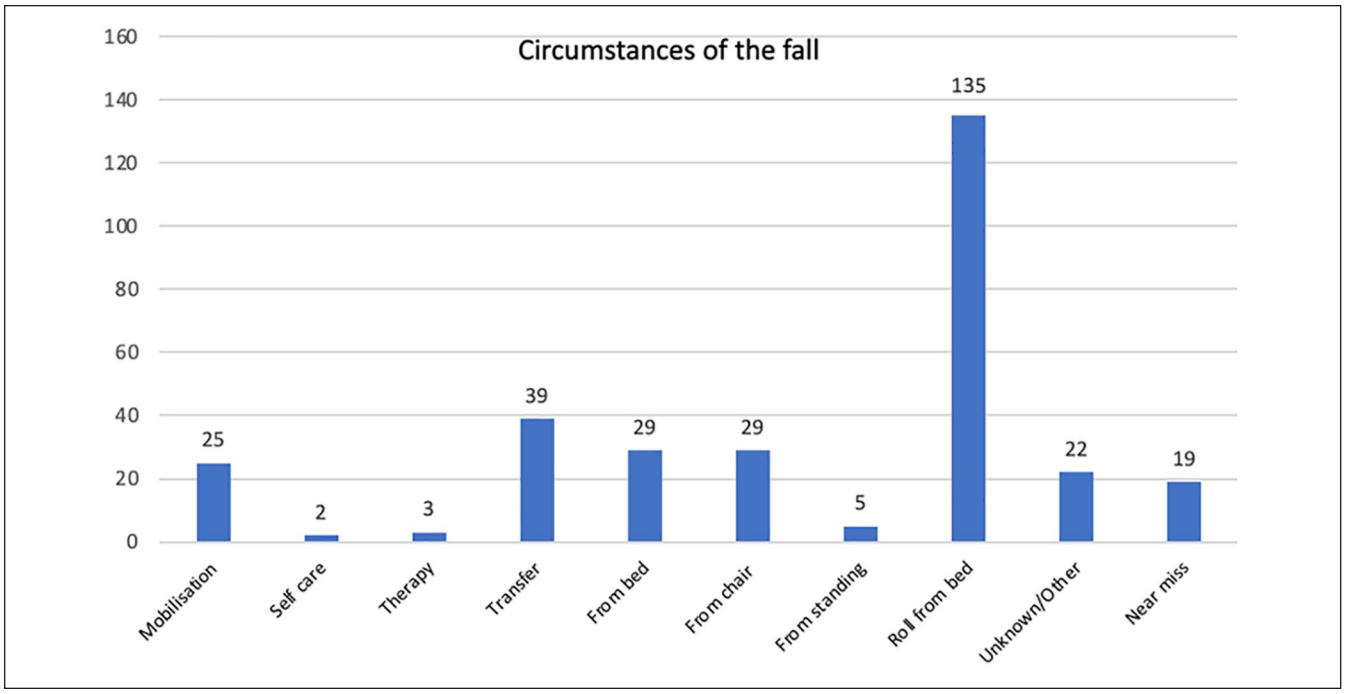


**Figure 3.** Circumstances of falls for patients with communication disability following stroke.

methods of detection of unwitnessed falls were responding to the bed/chair alarm (8.4%) and hearing the noise of the patient falling (4.5%). Rarely were staff alerted to a fall by the patient calling out for assistance, using the call bell or by other patients or visitors seeking help.

### *Protective/Prevention Factors Following a Fall*

Following a fall and its investigation as a patient safety incident, seven participants (6.4%) were given falls prevention education specific to the circumstance of their fall (e.g., education to encourage the use of the call bell). Other strategies involved the introduction and use of falls prevention or notification equipment (e.g., floor line bed, bed/chair alarm) and changes to the patient's environment (e.g., moving to a more visible room).

Of the 52 participants who had falls prevention strategies in place prior to their first fall, six (11.5%) had further strategies implemented following their first fall, all of whom went on to fall again. For 14 (26.9%) of the participants, falls prevention or protection strategies were introduced following their first fall with all but one of these patients going on to experience further falls. For a further 11 (21.2%) participants, falls prevention or protection strategies were put in place only after multiple falls, and all but one of those participants went on to experience further falls.

### *Patient Outcomes Following Falls*

Patient outcomes in the data reflected two categories specified in the Generic Reference Model (Runciman et al., 2006): (a) injuries and (b) suffering. Additional highly relevant outcomes were captured in the data but were not possible to categorize within the Generic Reference Model. These outcomes related specifically to rehabilitation and were (a) changes to independence; (b) additional investigations to check for injuries or physiological causes for falls; and (c) changes to management (e.g., downgrade of mobility to a more dependent method of mobilizing, removal of equipment to limit unsupervised use, and changes to therapy schedules).

Injuries occurred in 49 or 15.2% of the falls, and serious injury included 1 finger fracture, 1 intracranial hemorrhage, and 10 lacerations (two requiring sutures). Other minor injuries included bruising ($n=10$), swelling ($n=3$), grazes ($n=4$), skin tears ($n=3$), and pain ($n=9$). Multiple injuries occurred in five falls. Following a fall, some participants underwent additional investigations to check for injuries or causes of falls, such as computerized tomography (CT) brain scans ($n=26$) or X-rays ($n=16$).

A fear of falling was not commonly reported as an outcome of a fall, reported in only two (1.8%) of the participants. Other examples of patient suffering included frustration with the addition of bed/chair alarm ($n=1$), reluctance to participate in activities where a fall had occurred ($n=1$), and being upset about the positioning of the bed limiting the view of the TV ($n=1$).

### *Organizational Outcomes Following Falls*

The two categories of outcomes for the organization were (a) financial impact and (b) resource impact.

*Financial impact.* There were 26 additional CT scans and 16 X-rays performed across the participants as a result of the falls. Additional costs to prevent falls or protect patients from injury through equipment hire would include the cost of hire of bed/chair alarms, floor line beds, crash mats, and tilt-in-space wheelchairs.

*Resources impact.* The medical record documentation surrounding the falls indicated several impacts on the resources within the rehabilitation hospital system as a result of falls, whether or not the fall resulted in an injury. The additional investigations required to check for falls had staffing and scheduling impacts with patients requiring transport to and occasionally supervision in the radiology suite. Often, the incident reports and medical records reflected that participants required multiple staff members and equipment to assist them up from the floor, as well as a physical examination by a doctor, and additional checking and recording of observations (e.g., neurological signs, heart rate, blood pressure). Additionally, staff were required to complete incident reports and next of kin notifications, as well as investigate the fall which usually required a discussion by all team members involved in caring for the patient. Following the investigation of a fall, staff then spent time engaged in further falls prevention strategies such as hiring equipment, moving the participant to a room with high visibility (and thus moving other patients to accommodate this change), or altering the bedroom environment (e.g., moving a bed against a wall). Additionally, staff provided extra "rounding" (routine visit to the bedside to check on the patient) to five participants during their admission to provide extra visualization; one to one (continual observation) nursing was provided to one participant for a period of their admission; and additional supervision was provided to two participants during specific tasks as an added falls protection strategy.

## Discussion

This study examined the falls incidents of patients with communication disability following stroke, enabling a greater understanding of the circumstances and outcomes of the falls from the perspective of rehabilitation hospital staff on subacute stroke rehabilitation wards. The majority of falls examined in this study were unwitnessed rolls from a bed, and patients were typically found on the floor by staff. Patient factors, such as impaired balance, were most often identified as contributing factors and the most common falls prevention strategies involved equipment such as floor line beds and highly visible rooms to facilitate observation.

The finding that the majority of falls were a roll from a bed contrasts with previous literature on falls in patients with stroke, which reports the most common activities prior to a fall are transferring and walking (Batchelor et al., 2012; Bugdayci et al., 2011; Chaiwanichsiri et al., 2006; Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Sze et al., 2001). A recent systematic review found that patients with severe stroke are often excluded from falls research (Sullivan et al., 2020). Our finding is likely to reflect the inclusion of patients with severe stroke and therefore a greater physical impairment, evident by the mean FIM score of 37.6 and the percentage of participants who were non-ambulant on admission (78.9%). Furthermore, because of inconsistent definitions of a fall across the literature, a roll from bed may not always be included within this definition (Haines et al., 2008, 2009). In this study, the majority (78.9%) of patients were non-ambulant and required equipment such as a hoist to transfer, therefore limiting falls during walking or transferring. Furthermore, owing to the severity of their physical impairments, patients with severe stroke would more likely than not to be spending more time in bed across the day rather than sitting in a chair or wheelchair, thus accounting for the higher proportion of falls or rolls from bed compared to previous literature. This would also account for falls occurring throughout the day and overnight, rather than during peak activity times as reported in previous literature (Nyberg & Gustafson, 1997; Sze et al., 2001).

In more than one third of the falls in this study, a contributing factor could not be identified due to the fall being unwitnessed and the severity of the patient's communication disability. The inability to identify the contributing factors and circumstances of a fall limits the ability of staff to implement appropriate falls prevention strategies (Batchelor et al., 2010; A.-M. Hill et al., 2015). In relation to this, the high rates of unwitnessed falls in this sample and number of patients being found on the floor following a fall could be explained by the unique falls risk factors experienced by patients with communication disability following stroke. Patients with communication disability following stroke may engage in risk-taking behaviors or attempt to address an unmet need due to their difficulties using the call bell, attracting staff attention, or understanding falls prevention education (Balandin et al., 2001; Hemsley et al., 2013, 2019; Sullivan & Harding, 2019). These difficulties can arise for multiple reasons in patients with communication disability including the call bell being put out of reach and impairments to language comprehension impacting the ability to understand written and spoken words. Addressing the management of falls in patients with severe communication disability can be challenging owing to the reliance on a patient's communication skills to modify behaviors that might put them more at risk (e.g., walking without assistance) through falls prevention education (A.-M. Hill et al., 2015). These challenges may explain the number of participants with multiple falls in the current study, many of which were unwitnessed. It is not known whether these challenges may be overcome in part by the inclusion of speech pathologists in therapeutic falls prevention activities and falls prevention education for this population to support effective communication. It is possible that the tailoring of falls prevention education to suit an individual

patient's communication needs would help patients with severe communication disability to understand falls risk and actions they can take to reduce the likelihood of falls (Hemsley et al., 2013, 2019; Sullivan & Harding, 2019; Sullivan et al., 2020). This education may include alternative ways to gain attention from staff and waiting for assistance before attempting tasks. However, this may not be realistic for all patients with severe communication disability. In some cases, the functional implications of a patient's communication disability may be too significant for them to participate in falls prevention education and thus falls prevention efforts may need to be focused elsewhere (Sullivan & Harding, 2019).

The medical records and incident reports reviewed for this research provide limited information or insights into the outcomes of the falls for either the patient or the rehabilitation hospital service but do highlight the point that falls have consequences. Forty-nine falls in this cohort resulted in injury, and previous research has shown that patients who fall during their acute or rehabilitation hospital admission have an increased length of stay compared to those who do not experience a fall, and falls with injuries have further increases in length of stay compared to non-injurious falls (Czernuszenko, 2007; Czernuszenko & Czlonkowska, 2009; Morello et al., 2015; Ullah et al., 2019; Wong et al., 2016). This study also provided some evidence to suggest that after a fall, patients experienced changes to their recommended level of assistance (e.g., for activities of daily living or mobility) or the removal of equipment to prevent them from using it unsupervised (e.g., a power wheelchair). These activity limitations would have potentially led to reduced opportunity for subsequent incidental therapeutic opportunities to practice skills required to facilitate discharge. Additionally, the need for additional medical investigations such as CT scans could have contributed to lost time in therapeutic activities, adding to healthcare costs and potentially further impacting a patient's length of stay in an acute or rehabilitation hospital.

The results of this study suggest that there are a range of resource impacts to a health service as a result of falls. The financial and opportunity cost of a patient fall in acute and rehabilitation hospitals has been shown to be at least twice that of those who do not experience a fall (Morello et al., 2015). The financial costs incurred to the organization in this study in relation to medical imaging and equipment hire appear to support this research. The staff resource cost of non-injurious falls and falls that do not require additional investigations should not be discounted. Although a cost analysis was not conducted within the current study, the data provides evidence of these resource implications. For example, the majority of falls in this study required multiple staff members and equipment to assist the patient from the floor and a physical examination by a medical doctor. Some patients also required a review of mobility or seating by a physiotherapist or occupational therapist.

### *Limitations*

This study utilized the gold standard method to identify and report on adverse patient safety events in rehabilitation hospitals in the review of medical records (Blais et al., 2008; Rafter et al., 2015; Shojania & van de Mheen, 2020). The review of 8 years of medical records, using a patient safety framework to guide the extraction and analysis yielded a significant number of falls, each of which was analyzed in depth. However, the use of documents and reports to analyze patient safety incidents events has known limitations. There may be a proportion of falls, particularly near miss falls, that are not documented. Additionally, lapses in documentation may not account for all occasions of incidental falls prevention strategies discussed during care activities (e.g., during toileting, a nurse may remind a patient to use the call bell rather than attempting to mobilize independently). Furthermore, portions of medical record documentation may be inaccurate or illegible, particularly in the case of handwritten medical records such as the records in this study or have missing documentation. In this study, incident reports for every fall in the sample were not made or available, and there were some falls recorded as an incident report but not documented in the medical record. That is, the data source is known to be incomplete, and the sample gathered cannot be judged as being representative. In this study, these challenges were addressed where possible by the triangulation and matching of both medical records and incident reports to cross reference and supplement any missing or illegible data.

This study is also limited by its focus on only one health service as a source for data collection. Other health services may have different environmental and organizational factors for falls, due to differing ward layouts, therapeutic environments, and policies and procedures around falls prevention for patients with communication disability following stroke (Sullivan et al., 2022; Watson et al., 2019). However, the participant group is likely to reflect the typical clinical presentation of patients with communication disability following stroke. Thus, the findings of this study remain novel and are likely to be highly pertinent and relevant across similar health services and rehabilitation hospitals providing services to similar patients with stroke and communication disability.

The methods used to enhance rigor and trustworthiness in the data collection and analysis is a further strength of this study (Vassar & Matthew, 2013). Using a patient safety framework provided structure to the collection and analysis of information about adverse patient safety events. The Generic Reference Model (Runciman et al., 2006) is underpinned by a risk management structure and facilitated analysis of the data according to the key elements of patient safety incidents across three areas: (a) the contributing factors and hazards, (b) the incident details, and (c) the outcomes and consequences for the patient and the organization. Given this, the use of the Generic Reference Model (Runciman

et al., 2006) to guide the data extraction and analysis provided a theoretically sound means of synthesizing findings across the sample (Millman et al., 2011; Sullivan et al., 2020).

A range of methods were used in the data collection processes to increase confidence in the findings including (a) standardized data extraction forms; (b) a data extraction procedure manual to ensure consistency, accuracy, and reliability of the data collection; and (c) confirmation of the accuracy and reliability of data transcription by both the second author and an independent researcher.

### *Directions for Future Research*

The results of this study suggest that the categorical data collected from medical records and incident reports is useful but not sufficient for fully determining the outcomes and impacts both on stroke patients with communication disability who fall and on the rehabilitation hospital staff and health service involved. Further research on how the documentation of falls across both medical records and patient safety incident reports can be improved to outline more detail on the circumstances surrounding falls and their impacts is needed. At the point of the first documentation, data should be captured on the outcomes of the falls to inform a cost-consequence analysis that considers the factors identified as important in this study. The cost-consequences of falls, irrespective of injury, should be determined to better understand the full impact of falls on the acute and rehabilitation hospital systems.

Further research should examine how communication disability is reported in the medical record and incident reports for patients who fall, and examine the patient-related contributing factors in further detail. Extending further than the categorical analysis undertaken in this study, a qualitative analysis of the textual contents of the documentation on falls in medical records and incident reports could provide a more in-depth understanding of the factors leading up to and following falls, including any role of communication disability in the fall. Researchers should seek the views of acute and rehabilitation hospital patients with stroke and communication disability and their visitors on their falls, and circumstances surrounding their falls. This could be obtained through interviewing and direct observation of the ward environment and staff and patient interactions. Accounts of acute and rehabilitation hospital patient falls from visitors may also provide crucial information on circumstances surrounding falls. Such methods being applied to this area may enhance understanding of falls and assist in informing prevention strategies (Millman et al., 2011; Shojania & van de Mheen, 2020).

In order to draw comparisons between the context of falls for patients with stroke who have communication disability and those who do not, and understand more about relative risk, context, or outcomes, larger scale medical record and incident report studies that would enable comparisons are warranted. Research exploring how patients with communication disability following stroke might be supported to report on "what happened" when they fell would also be useful in addressing the problem of unwitnessed falls in this study.

## Conclusion

This study analyzed, using a patient safety framework, the contributing factors, circumstances, and outcomes surrounding 308 rehabilitation hospital falls in 109 patients with communication disability following stroke, a population largely excluded from prior falls research. The findings suggest that unwitnessed rolls from the bed were the most common, with the patient being found on the floor by staff. The majority of falls were attributed to a patient factor rather than the environment or organization, and equipment provision appeared to be the most common falls prevention strategies employed. There remains a gap in understanding the reasons patients are rolling or falling from the bed and understanding this may help identify ways to reduce the risk and incidence of falls in this vulnerable population. Further research should consider the qualitative content of written accounts of falls in medical records and incident reports, and patient/visitor accounts to provide further in-depth understanding of the factors leading up to and following the falls, and any role of communication disability in the falls of patients with stroke and communication impairments.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research has been funded by an Australian Government Research Training Program Scholarship and a Jumbunna Postgraduate Research Scholarship.

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### Supplemental Material

Supplemental material for this article is available online.

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## Author Biographies

**Rebecca Sullivan** is a Certified Practicing Speech Pathologist at Eastern Health and current PhD Scholar in the Graduate School of Health, University of Technology Sydney. Rebecca's PhD, of which this study is a part, is focusing on falls in hospital in patients with communication disability following stroke.

**Dr Katherine Harding** is a Principal Research Fellow with the Eastern Health Allied Health Clinical Research Office and La Trobe University. Her research interests include improving access to health services, improving outcomes after rehabilitation and models of health service delivery in hospital and community care. She is a co-supervisor of the first author's PhD candidature.

**Dr Ian Skinner** is a Senior Lecturer at Charles Sturt University and a registered physiotherapist. Ian is interested in clinical research which aims to improve the quality of life for people who live with chronic health conditions through collaborative and effective multidisciplinary care. He is a co-supervisor of the first author's PhD candidature.

**Professor Bronwyn Hemsley** is the Head of Speech Pathology at University of Technology Sydney, a Certified Practicing Speech Pathologist, Fellow of Speech Pathology Australia, and Fellow of the International Society for Augmentative and Alternative Communication. She is the primary supervisor for the first author's PhD candidature. Bronwyn's research includes using Information Communication Technologies in communication disability and hospital safety for people with severe communication impairments.

Supplementary Table 1: Characteristics of participant communication disability following stroke

| **Severity of communication disability** | **Type of Communication Disability** |
|---|---|
| Mild (n = 9) | Dysarthria (n = 7)<br>Expressive aphasia (n = 1)<br>Expressive and receptive aphasia (n = 1) |
| Moderate (n = 28) | Cognitive communication disability (n = 1)<br>Dysarthria (n = 5)<br>Expressive and receptive aphasia (n = 10)<br>Expressive and receptive aphasia and dysarthria (n = 4)<br>Expressive and receptive aphasia and cognitive communication disability (n=3)<br>Expressive and receptive aphasia and apraxia of speech (n = 2)<br>Expressive and receptive aphasia, apraxia of speech and dysarthria (n = 2)<br>Expressive aphasia and dysarthria (n = 1) |
| Severe (n=61) | Expressive and receptive aphasia (n = 23)<br>Expressive and receptive aphasia and apraxia of speech (n = 21)<br>Expressive and receptive aphasia, dysarthria and cognitive communication disability (n = 4)<br>Expressive and receptive aphasia, apraxia of speech and dysarthria (n = 4)<br>Expressive and receptive aphasia and dysarthria (n = 3)<br>Cognitive communication disability (n = 1)<br>Dysarthria (n = 1)<br>Dysarthria and cognitive communication disability (n = 1)<br>Expressive aphasia and dysarthria (n = 1)<br>Expressive and receptive aphasia and cognitive communication disability (n = 1)<br>Receptive aphasia and apraxia of speech (n = 1) |
| Profound (n=7) | Expressive and receptive aphasia and apraxia of speech (n = 3)<br>Dysarthria (n = 1)<br>Expressive and receptive aphasia (n=1)<br>Expressive and receptive aphasia and cognitive communication disability (n = 1)<br>Expressive and receptive aphasia and dysarthria (n = 1) |
| Missing severity | Expressive and receptive aphasia (n = 2)<br>Expressive aphasia and cognitive communication disability (n = 1)<br>Dysarthria and cognitive communication disability (n = 1) |

Falls in hospital patients with communication disability.

## Chapter 9: "Patient unable to express why he was on the floor, he has aphasia." A Content Thematic Analysis of Medical Records and Incident Reports on the Falls of Hospital Patients with Communication Disability Following Stroke.

Chapter 8 used descriptive analysis of medical records and incident reports to determine the potential contributing factors, circumstances, and outcomes of falls in patients with communication disability following stroke. The outcomes of the study described in Chapter 8 suggest that patients with communication disability following stroke commonly experience unwitnessed falls from bed of which patient factors were considered the most common contributing factor to these falls. Additionally, there was a proportion of patients where the circumstances and contributing factors to the fall were unknown due to the fall being unwitnessed and the patient being unable to describe the fall. Following the results of Chapter 8, there is a gap in understanding the reasons why patients are rolling or falling from bed and Chapter 9 aims to further understand the circumstances and contributing factors to falls in patients with communication disability following stroke through a content analysis of documentation in medical records. The insights of health professionals when documenting falls in the patient's medical record and incident report may assist in further understanding the effect of communication disability on falls which may help to develop targeted falls prevention strategies for patients with communication disability following stroke.

This study was published in International Journal of Language & Communication Disorders. The publication is open access and is used with permission as part of a thesis (Creative Commons CC BY). This study is available online at: https://onlinelibrary.wiley.com/doi/10.1111/1460-6984.12916. The bibliographic reference is:

Falls in hospital patients with communication disability.

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023) 'Patient unable to express why he was on the floor, he has aphasia.' A content thematic analysis of medical records and incident reports on the falls of hospital patients with communication disability following stroke. *International Journal of Language & Communication Disorders,* 58, 2033 – 2048.

Received: 23 August 2022 | Accepted: 30 May 2023

DOI: 10.1111/1460-6984.12916

International Journal of Language & Communication Disorders

RESEARCH REPORT

# ‘Patient unable to express why he was on the floor, he has aphasia.’ A content thematic analysis of medical records and incident reports on the falls of hospital patients with communication disability following stroke

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**Funding information**
This research was funded by an Australian Government Research Training Program Scholarship and a Jumbunna Postgraduate Research Scholarship.

## Abstract

**Background:** People with communication disability following stroke are at risk of falls during inpatient rehabilitation. However, they are often excluded from hospital falls research, and little is known about the circumstances or outcomes of their falls to inform risk management strategies.

**Aims:** To examine hospital medical records and incident reports relating to falls of patients with communication disability following stroke for content codes, categories and themes relating to communication.

**Methods & Procedures:** This medical record chart review examined data on 72 patients and 265 falls. A content thematic analysis was used to identify how patient communication is characterized in relation to falls, and their prevention and management strategies.

**Outcomes & Results:** The data reflected that staff viewed patients having difficulty following simple instructions as contributing to falls. Gaining the attention of staff and communicating basic needs were also considered to be contributing factors for falls. Patients were often described as experiencing a fall when taking a risk or attempting to address an unmet basic need. Furthermore, written notes for patients with more severe communication disability reflected that the patient’s communication impairments prevented staff from establishing the circumstances of some falls and complicated the assessment for injury following a fall.

**Conclusions & Implications:** The medical records and incident reports of patients with communication disability following stroke reveal that hospital staff recognize the impact of communication disability as potential risk factors for falls for this group. It was difficult for staff to report the circumstances of the fall for patients with severe communication disability. Despite the recognition

of communication as a potential contributing factor, few medical record entries documented strategies related to communication interventions to improve patients' ability to understand instructions, gain attention or communicate basic needs.

**KEYWORDS**
communication disability, falls, falls research, inpatient, patient safety, stroke

**WHAT THIS PAPER ADDS**

*What is already known on the subject*

- People with stroke are at a high risk of falls during their hospital admission. However, little is known about the circumstances of their falls and the influence of communication disability on these falls.

*What this paper adds to existing knowledge*

- Patients with communication disability have unique factors that contribute to their falls in the hospital. Patients were described as experiencing a fall when taking a risk or attempting to address an unmet need, and these falls were often related to a patient's difficulties communicating their basic needs, gaining attention from staff, and following simple instructions.

*What are the potential or actual clinical implications of this work?*

- Communication disability as a risk factor for a fall, and fall prevention strategies tailored to the communication disability, were typically identified and documented by physiotherapists, occupational therapists and nursing staff. The inclusion of speech pathologists in fall risk assessment, management, and prevention strategies may provide crucial information regarding the patient's communication disability that may enhance their fall prevention plan.

## INTRODUCTION

Falls in hospital impose a high-cost impact on health services and patients; including injury, loss of functional capacity and increased length of hospital stay (Batchelor et al., 2012; Hill et al., 2007; Morello et al., 2015). People with stroke are at a high risk of falls, with between 14% and 65% of patients falling at least once during their hospital admission (Batchelor et al., 2012; Walsh et al., 2016). Risk factors for falls in patients with stroke include balance impairments, difficulties with self-care and activities of daily living, and neglect (Campbell & Matthews, 2010; Denissen et al., 2019)).

Communication disability, specifically related to aphasia, dysarthria, apraxia of speech, and cognitive communication difficulties, affects an estimated 64% of people with stroke (Mitchell et al., 2020, O'Halloran et al., 2009) and can lead to barriers to their effective communication with hospital staff (O'Halloran et al., 2012; Simmons-Mackie & Kagan, 2007; Sullivan et al., 2020, 2023) and adverse events in hospital (Hemsley et al., 2013). People with communication disability following a stroke are three times more likely to experience adverse events, including falls, during their hospital admission (Bartlett et al., 2008) when compared with people without communication disability. However, there is limited research evaluating strategies suggested to improve patient safety for those with communication disability in hospitals (Hemsley & Balandin, 2014). Indeed, patients with communication disability are often excluded from falls research because of their communication impairments (Hemsley et al., 2019). Although a recent systematic review and meta-analysis did not find an

association between communication disability and falls, the findings of the review were limited by the majority of the 15 included studies either excluding participants with severe communication disability or not reporting on the severity of participants' communication disability (Sullivan et al., 2020). Associations between communication disability were reported in four of the studies which also specified the inclusion of patients with severe communication disability. A secondary analysis of the same studies indicated that there was little information in research to date regarding the circumstances and contributing factors to falls in hospital for people with communication disability following stroke (Sullivan et al., 2021).

The reports of patients with communication disability following stroke and their family members suggest that this group may have unique factors that contribute to falls in the hospital, including difficulties gaining attention through the call ball system, and communicating their needs to staff (e.g., the need for the toilet, hunger, pain) (Hemsley et al., 2013; Sullivan & Harding, 2019). Furthermore, people with communication disability reportedly have difficulties following instructions, such as those required to transfer from a bed to a chair, which in some circumstances has resulted in a fall (Sullivan et al., 2020; Zdobysz et al., 2005). The combination of these communication difficulties may result in people engaging in risk-taking behaviours such as attempting to walk to the toilet alone to meet their own needs (Sze et al., 2001).

A recent study examining the medical records and incident reports relating to the context and circumstances of falls in patients with communication disability after stroke, over an 8-year period, found that a substantial number of falls were unwitnessed falls or rolls from the bed (Sullivan et al., 2023). Patients typically found on the floor by staff also had equipment such as floor line beds and bed and/or chair alarms used in an effort to prevent the falls and protect the patient from injury (Sullivan et al., 2023). Furthermore, many falls had reportedly occurred with unknown contributing factors, as the severity of the person's communication disability meant they were unable to recount the details of the fall. Nonetheless, where circumstances of the fall could be reported, the falls were largely attributed to patient factors, such as balance impairments, weakness, and neglect (Sullivan et al., 2023).

The insights of hospital staff documenting the falls in medical records and incident reports may further assist in identifying ways to reduce the risk and incidence of falls in this vulnerable population. Knowing more about the circumstances and contributing factors for falls in people with communication disability following stroke may provide further insights into the impact of communication disability on falls and on falls-prevention strategies. The written accounts of hospital staff at the time of a fall, required in the medical records and incident reports, could reveal more about the influence of communication disability on falls. This documentation may also provide insights into the ways that staff respond to these incidents, including any follow-up strategies in relation to communication. Therefore, the aim of this study was to examine the written texts contained in hospital medical records and incident reports on falls, for content relating to communication disability and communication strategies; to contribute to an in-depth understanding of ways to further understand and manage falls risk and prevention strategies for this vulnerable group.

## METHOD

A medical record and incident report review with content thematic analysis with both deductive and inductive coding (Elo & Kyngäs 2008; Lyons et al., 2022) was conducted for patients admitted to stroke rehabilitation wards over an 8-year period (2013–21) who also had a documented communication disability following stroke. Ethical approval for this study was obtained from the health service human research ethics committee and the universities involved. In this paper, the term 'participants' is used to refer to the specific patients whose data were included in this research, and the term 'patients' is used when referring to the patient population more broadly.

The methods of this medical record review of progress notes and incident reports have been described in detail previously in a paper outlining the types of falls, perceived contributing factors and circumstances, and risk management strategies (Sullivan et al., 2023). The prior study took a quantitative, categorical approach to describing falls in patients with communication disability including the perceived contributing factors for falls, the circumstances of a fall, and falls prevention strategies. The results of that research suggested that communication disability was one perceived contributing factor to falls for this patient group (Sullivan et al., 2023). The present study approaches the data with a complementary qualitative interpretation of the data, to understand more about the nature of the falls, and ways that communication disability is framed and positioned by hospital staff in their written accounts of what happened and what followed a fall.

### Context

Participants were enrolled from two 32-bed subacute rehabilitation wards at a major metropolitan health network in

Australia. Each subacute ward is a 32-bed facility offering both neurological and orthopaedic rehabilitation under the care of a medical rehabilitation consultant and multidisciplinary allied health and nursing team. Patients with stroke participate in a patient-specific, goal-directed intensive rehabilitation programme with a similar model of care provided across both wards. Patients are placed in either single or shared rooms (up to four beds per room) and attend therapy sessions in dedicated spaces (e.g., a gymnasium, patient kitchen area) and in their bedrooms. Each patient is provided with a call bell, placed within reach, including consideration of any physical difficulties accessing the call bell due (e.g., hemiplegia, hemianopia). Where patients are unable to use the call bell, they may be offered alternatives such as a doorbell chime or hand-held call-bell if appropriate (i.e., if the patient is able to use these to attract attention). Additionally, when in their rooms, patients are meant to have their mobility aid, a drink, and other personal items within their reach as standard falls prevention strategies.

In the organization providing access to the data, patients who are admitted to subacute rehabilitation with communication disability following stroke are assessed by a speech pathologist and provided with individualized, goal-directed, evidence-based therapeutic interventions. Intervention may be delivered individually, in groups, or in conjunction with other therapists (e.g., physiotherapists). Where appropriate, patients are provided with augmentative and alternative communication aids or visual supports to assist with the communication of needs and wants.

## Sampling strategy and inclusion criteria

The health service provided a spreadsheet of the medical record numbers of all patients admitted with stroke to the subacute wards between July 2013 and June 2020, with each admission forming an episode of care. Additionally, all patients with stroke admitted between 1 September 2020 and 31 August 2021 were prospectively followed through their admission using a patient management system and screened against the inclusion criteria. The first author sorted each episode of care chronologically and matched the medical record number to eligible patients.

Patients were eligible for inclusion if: (1) they were admitted to one of the subacute wards following a left hemisphere stroke; (2) had a *new* associated communication disability following stroke, as diagnosed by a speech pathologist; (3) had a documented fall or near miss fall during their subacute rehabilitation admission; and (4) their medical records and incident reports included comments relating to communication disability that would provide further insights into hospital falls of patients with communication disability following stroke (Table 1).

## Data collection methods

The medical records accessed via the electronic medical record and fall incident reports for included participants were obtained in full from the organization. Medical records and incident reports were de-identified after being matched to the participants and their falls. An Excel database was created and included data for each participant on: (1) demographics, (2) length of stay in subacute rehabilitation and (3) total admission functional independence measure (FIM) score. Further, all entries from these two data sources for each participant were transcribed verbatim into a bespoke Word document in relation to: (1) speech pathology notes regarding the type and severity of communication disability, including assessment tools used for diagnosis; (2) entries from the multidisciplinary team (e.g., nurses, speech pathologist, medical doctors and physiotherapists) pertaining to communication disability during the 24 h before and 72 h following the fall or near miss fall; and (3) circumstances surrounding the fall (e.g., activity during the fall, medical assessment following a fall).

## Data analysis

The Generic Reference Model (Runciman et al., 2006) is a patient safety framework used to guide the collection and classification of information about a patient safety incident according to three key stages of the incident: (1) the contributing factors to the incident, (2) the incident, and (3) the outcomes of the incident for the patient and the organization. As the model does not include an assessment of risk factors that lead to a patient safety incident, identified risk factors were coded separately. The relevant aspects of the model are outlined in Table 2 with examples. The data were initially coded according to the factors within the Generic Reference Model (Runciman et al., 2006). A content thematic analysis of the data was then completed (Elo & Kyngäs 2008; Lyons et al., 2022) using data from any documents that included communication disability. This involved: (1) reading and re-reading the extracted data; (2) applying codes to unique categories of meaning within the data; (3) generating themes in a constant comparison manner as participants' data came into the study; and (4) developing, refining and verifying themes connecting categories within and across the data.

**TABLE 1** Inclusion and exclusion criteria

| Inclusion criteria | Definition | Exclusion criteria |
|---|---|---|
| Left hemisphere stroke | Confirmed through the results of a reported computed tomographic (CT) scan or magnetic resonance imaging (MRI) | Patients with right hemisphere stroke, a suspected stroke that was not confirmed by imaging, or with bilateral hemisphere or intraventricular stroke, were excluded |
| New communication disability | Diagnosed by a speech pathologist for the stroke admission following an informal or formal assessment of communication skills | Patients with significant cognitive impairments impacting on communication (e.g., dementia); and those with a pre-existing communication disability (e.g., related to a prior stroke) were excluded |
| Falls | 'An event which results in a person coming to rest inadvertently on the ground, floor or other lower level' | |
| Near miss falls | 'An error that has the potential to cause an adverse event [patient harm] but fails to do so because of chance or because it is intercepted' | |
| Comments relating to communication disability | Documentation in the 24 h before or 72 h following a fall from either the medical record or the incident report included reference to the patient's communication disability in relation to the fall or near miss fall | Patients whose medical records did not include reference to communication disability in relation to a fall or near miss fall, in the 24 h before or 72 h following a fall or near miss fall, were excluded |

**TABLE 2** Generic reference model (Runciman et al., 2006)

| Stage of incident | Example |
|---|---|
| **Contributing factors and hazards** | |
| Environmental factors | Lighting, floor surface, ward clutter |
| Organizational factors | Staffing levels, falls prevention policies |
| Human factors | Inappropriate assistance by staff/family |
| Patient factors | Balance impairments, dependence for activities of daily living, communication disability |
| Medication, equipment, documentation | Medications, failure of equipment, error or conflicting documentation, e.g., about a transfer |
| **The incident** | |
| Timing of incident | Time of day of the incident |
| Method of detection | Found on the floor, witnessed fall, unwitnessed fall |
| **Outcomes and consequences for the patient** | |
| Injury | Sprain, skin tear, fracture |
| Suffering | Fear of falling, mood changes, delay/change in therapy, further medical investigations |
| **Outcomes and consequences for the organization** | |
| Subsequent or planned action | Additional investigations, hiring of equipment |
| Resource impact | Bed changes, additional observations, additional staffing |

## Researcher interpretation and verification steps to increase rigour

All members of the research team had experience working in clinical settings with patients with stroke. The first author and coder is a speech pathologist with extensive experience working with patients with communication disability following stroke and knowledge of the context of the metropolitan health network as an employee. The third author is an occupational therapist employed by the metropolitan health network in a non-clinical role. Any pre-existing views held by these authors about the

content of written texts in relation to communication disability and falls (through their employment with the organization or professional bias) were acknowledged and managed through the data collection and analysis. This included all authors discussing, over several iterations of coding of categories and arrival at the content themes, a range of alternative explanations from a variety of interdisciplinary viewpoints (the second author is a speech pathologist and the final author is a physiotherapist). The verification of themes and relationships within the data was discussed by the authors who all had access to the transcribed raw data. The accuracy of data extraction was confirmed by two research research assistants not involved with data collection as an external step increasing rigour, increasing credibility and trustworthiness of the findings (Elo & Kyngäs 2008).

To further increase the verifiability and plausibility of the researcher's interpretations in relation to the text-based data, quotes and excerpts are used to illustrate the themes and support the findings. These are labelled according to the participant (patient who fell) and the corresponding entry in the medical record or incident report; as in P1MR refers to a participant 1 medical record entry, and P1IR refers to a participant 1 incident report entry. As described above, as these participants are a subset of a prior study, (Sullivan et al., 2023), the participant numbering is non-sequential. The use of a patient safety framework to guide the data collection and synthesis as well as using a constant comparison method to develop the themes provided a theoretically sound method of synthesizing findings (Walshe & Boaden, 2006).

# RESULTS

## Participants

A total of 1962 episodes of care were screened against the eligibility criteria. In total, there were 72 participants with documentation relating to 265 falls included in the research (Figure 1). The mean age of the participants was 73.5 years (SD = 11.1, range = 41–94 years) with 44 men (61.1%) and an average length of stay in the rehabilitation ward of 35.3 days. More than two-thirds of participants (69.4%) were diagnosed with a severe or profound communication disability and the most common diagnosis was an expressive and receptive aphasia (33%) or aphasia co-occurring with apraxia of speech (26.4%). In addition to their communication disability, the majority of participants were incontinent, unable to mobilize, and required full assistance for their activities of daily living. Further participant details are outlined in Table 3 and Table S1 in the additional supporting information.

## Participants' communication disability

Communication disability in this population included aphasia, dysarthria, apraxia of speech or cognitive communication disability, or combinations of these. Communication disability was diagnosed by a speech pathologist using a combination of standardized assessment tools and functional communication assessment. Documentation of participants' communication disability by speech pathologists typically included comments or assessment at the impairment level of (1) receptive language skills, (2) expressive language skills, (3) motor speech, (4) a diagnostic statement, and (5) strategies for staff to support communication in their interactions with participants. In some documentation, the speech pathologist documented their clinical opinion on if the patient could communicate their basic needs or not and a statement regarding risks of adverse events in hospital. Examples of clinician documentation can be found in Table S2 in the additional supporting information. In 49 participants, speech pathologists used one of the following standardized assessment tools to assess the communication disability : (1) Western Aphasia Battery (Kertesz, 2007), (2) Comprehensive Aphasia Test (Swinburn et al., 2004), (3) Frenchay Dysarthria Assessment (Enderby & Palmer, 2008), (4) Cognitive Linguistic Quick Test (Helm-Estabrooks, 2001), and (5) Mt Wilga High-Level Language Assessment (Christie et al., 1986). On admission to rehabilitation, four participants had a mild communication disability, 15 had a moderate communication disability, 47 had a severe communication, and three had a profound communication disability as diagnosed by a speech pathologist. In three participant records, a speech pathologist had provided a diagnostic statement following an assessment, however, the statement did not include a measure of severity.

## Authors of the documents

Documentation in the medical record or incident reports regarding communication disability surrounding a fall was made by nurses, physiotherapists, medical doctors, speech pathologists, and occupational therapists.

## Content thematic analysis

The content themes are presented in a sequential order supported in the Generic Reference Model of Patient Safety (Runciman et al., 2006) and reflecting the patient journey relating to: (1) risk factors leading up to the falls, (2) falls prevention strategies implemented, (3) contributing

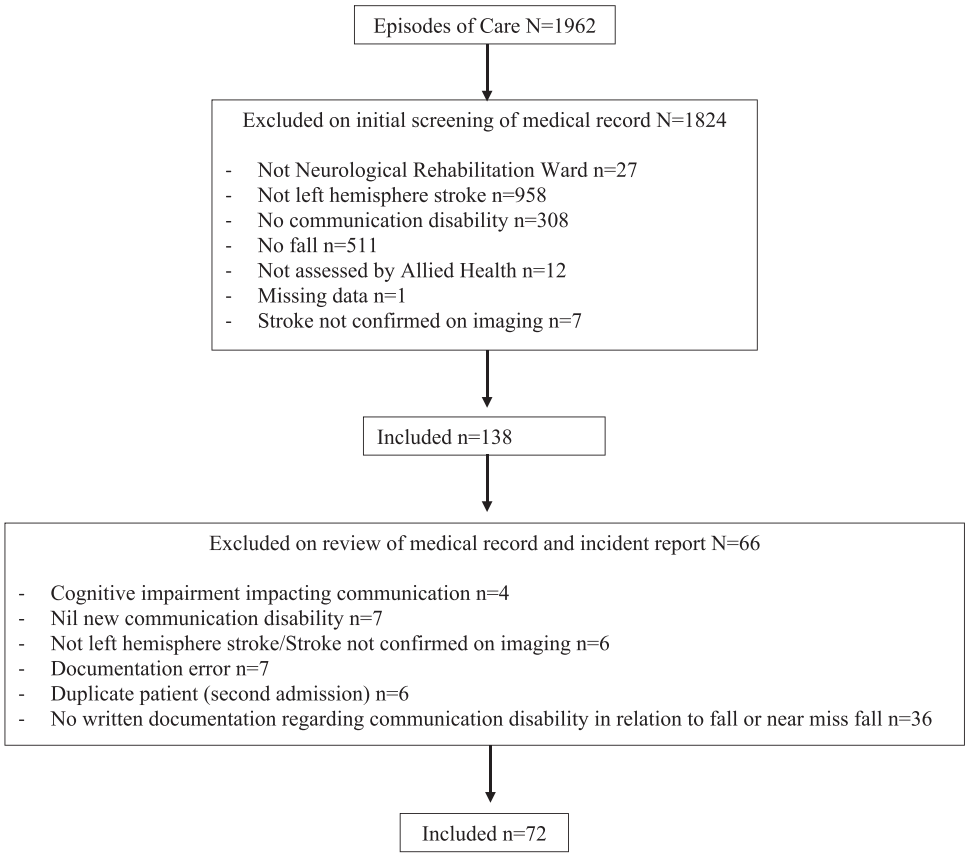


**FIGURE 1** Case identification flowchart

**TABLE 3** . Participant characteristics by severity of communication disability

| | Mild | Moderate | Severe | Profound | Missing severity data | Total |
|---|---|---|---|---|---|---|
| *n* | 4 | 15 | 47 | 3 | 3 | 72 |
| Age (years) | 74.6 | 73.5 | 73.9 | 74.7 | 69.2 | 73.5 |
| [mean (SD; range)] | (9.9; 45–80) | (11.1; 41–94) | (11.1; 41–94) | (13.3; 62–90) | (10.8; 76–85) | (11.1; 41–94) |
| Gender | 2 | 11 | 28 | 2 | 1 | 44 |
| [*n*(%) male] | (50) | (73.3) | (59.8) | (66.7) | (33.3) | (61.1) |
| LOS | 47.5 | 48.0 | 46.5 | 39.1 | 62.3 | 35.3 |
| ([mean days, (SD; range)] | (28.6; 51–58) | (31.0; 30–159) | (28.4; 3–161) | (25.2; 21–86) | (41.6; 27–48) | (30.9; 3–161) |
| Total FIM | 33.5 | 34.6 | 34.6 | 34.9 | 41.4 | 34.8 |
| [mean (SD; range)] | (17.9; 18–77) | (17.8; 20–60) | (17.6; 18–86) | (23.6; 18–20) | (12.9; 18–46) | (17.8; 18–86) |
| Falls per participant | 2.7 | 3.7 | 3.8 | 7.3 | 1.3 | 3.7 |
| [mean (SD; range)] | (1.7; 1–3) | (5.3; 1–5) | (5.4; 1–40) | (11.3; 1–11) | (0.5; 1–2) | (5.3; 1–40) |

*Note*: FIM, admission functional independence measure. LOS: length of stay in hospital.

factors for a fall, (4) the fall incidents as described in the documents, and (5) outcomes of the falls. The presentation of themes is supported by matched verbatim quotes extracted from either the medical record (MR) or incident report (IR) and Figure 2 describes how these themes are related to one another.

## Risk factors for a fall

### Difficulties following instructions

In 10 of the 72 participants (13.9%), staff documentation included reference to the participant's communication

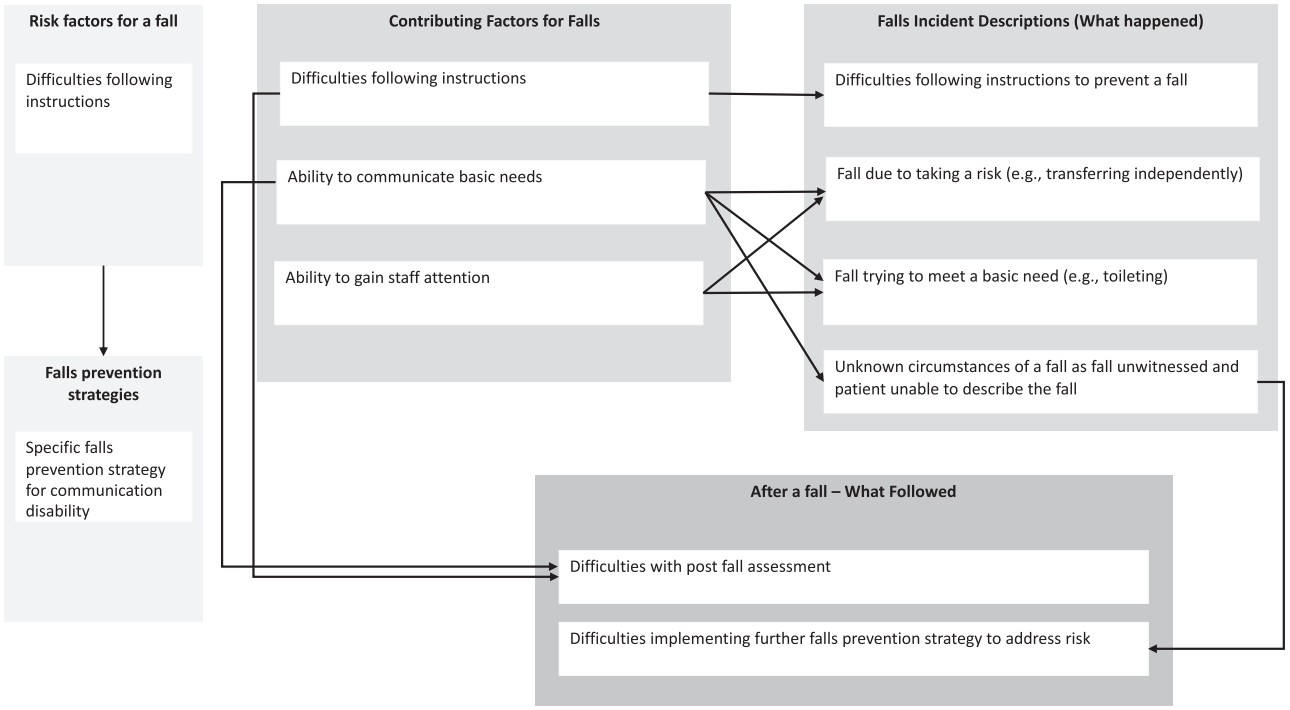


**FIGURE 2** Communication disability factors appearing in the medical records and incident reports of falls in participants with communication disability following stroke

disability placing them at risk of a fall; specifically in relation to the patient having difficulty following instructions, and often in conjunction with a physical impairment, as P16MR wrote, '[patient] has significantly decreased sitting balance and is inconsistent following commands—significant falls risk'.

### Impaired receptive language

The documents also revealed other elements of impaired receptive language potentially impacting on falls risk, documented by staff in the medical record during the 24-h period before or in the 72 h following a fall. Participants were described in the notes as requiring prompting, or being unable to follow specific prompting, such as '[transfers] very poorly does not respond to 1 step commands, for hoist [transfer] now' (P42MR). Participants were also described as being 'disorganized' or 'incoherent' or as having difficulties responding to 'redirection' and following safety instructions as in 'Patient needs close supervision as patient appears to be incoherent … needs prompting and direction' (P21MR).

## Specific falls prevention strategies for communication disability

### Communication strategies for staff

Strategies to mitigate the risk of falls related to communication disability were described in 10 (or 13.9%) of the participants included in the sample. These risk mitigation strategies related to adaptations staff needed to make when communicating with participants during functional tasks such as transfers '[patient] requires clear step by step instructions [during transfers]' (P95MR) and were provided by physiotherapists or occupational therapists. Following their communication assessment, speech pathologists commonly recommended strategies such as 'use short simple sentences' (P12MR) for staff to use in all care activities and interactions.

In one case, falls prevention education was delivered to a participant by the occupational therapist using adapted communication strategies. In this case, the participant had mild receptive and expressive aphasia. Supervision while using a wheelchair had been recommended, and the patient had subsequently experienced a fall from a

wheelchair. The written data reflected that information about the participant's need for supervision was conveyed verbally to the participant, who became frustrated with this recommendation. The occupational therapist made the following entry in the medical record, suggesting that they subsequently provided education adapted to the participant's communication needs:

> Pt [patient] became increasingly frustrated this past week at OT's [occupational therapist's] recommendation for supervision with mobilising in power wheelchair. Upon d/w [discussion with] SP [speech pathologist] it was found that patient was unaware why [redacted] was requiring supervision and also SP have found [patient's] reading comprehension more effective than auditory. Consequently, OT clearly outlined in writing for [patient] that he needed to work on [functional skills] if [patient] has had no accidents, he can be made independent on the ward.(P1MR)

## Contributing factors for falls

In addition to difficulties following instructions in activities of daily living and therapeutic tasks, two further themes were identified as contributing factors for falls: (1) the patient's ability to gain attention by using the call bell, calling, or shouting out, or other behaviour; and (2) the patient's ability to communicate their basic needs such as the need to use the toilet, hunger or pain.

### Ability to gain staff attention

In total, the medical records and incident reports described 24 (33.3%) participants as being able to gain attention and the method used to do so (e.g., using the call bell or shouting/calling out). Most reports of the ability and manner of gaining attention was documented by nursing staff in relation to a functional task, as in: 'Presses buzzer for assistance with urinal' (P49MR). Nursing staff also identified other behaviours participants used to gain attention and assistance, such as calling out, shouting for help, or idiosyncratic methods such as becoming restless or agitated thus activating the bed and/or chair alarm alerting staff, as in the following quote: 'Patient initiates toileting by fidgeting' (P22MR).

There were 11 participants whom hospital staff had documented as not having a way to gain attention or assistance, for example: 'Difficult to communicate with patient, does not initiate any care needs' (P18MR). In total, the 11 participants described in the medical records or incident reports as being unable to gain attention through any method experienced 65 (24.5%) of the total falls.

### Ability to communicate basic needs

At the time of documenting admission, 21 (29.2%) of participants were described in the document data (either by speech pathologists during assessment or by nursing staff during functional tasks) as not being able to communicate their basic needs on the ward through any method (i.e., verbally, gesture, augmentative or alternative communication, or picture boards), and 18 (25%) were described as able to communicate their basic needs. For the remainder ($n$ = 51), their ability to communicate basic needs was not documented. Some participants were reportedly able to attract attention but unable to communicate their basic needs, as in the following quote from the medical record:

> [patient] buzzing frequently … mostly unable to say what he wanted … became quite agitated when staff went to leave' (P2MR).

Where a participant's ability to communicate their basic needs was not documented explicitly by staff, some of this information was described briefly or indirectly in the speech pathology medical record entries as in

> '… communication largely non functional'. (P4MR)

Participants who were unable to communicate their basic needs were often described in the medical record by nursing staff as being unable to communicate effectively, as in 'Patient unable to verbalise needs' (P21MR); or as having non-functional communication by speech pathologists, as in 'Communication remains non-functional and unreliable at a basic level' (P27MR). Other descriptions reflected that staff viewed the participant as being 'non-verbal', 'alert and vague' or found it 'difficult to communicate' with the patient. The 21 participants who were unable to communicate their basic needs experienced 147 (55.5%) falls, accounting for more than half of the falls in the sample.

## Falls incidents

Of the 265 falls experienced by the 72 participants, 194 (73.7%) occurred when: (1) the participant was

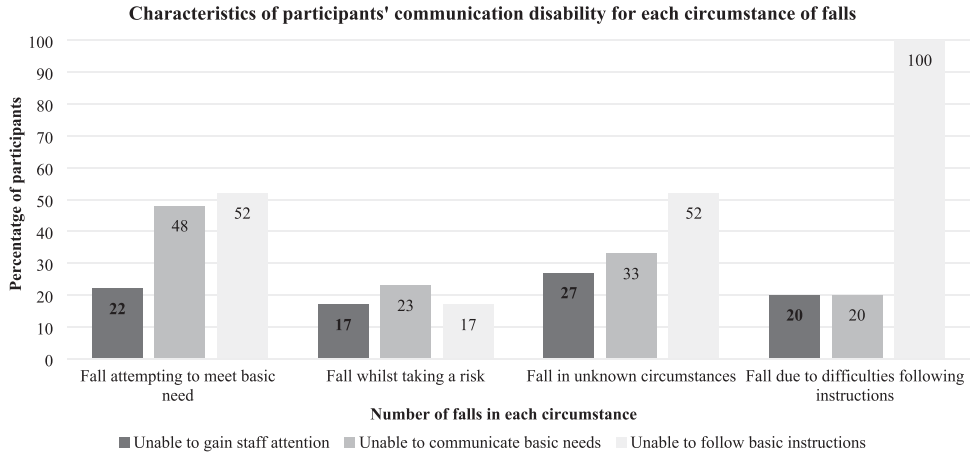


**FIGURE 3** Characteristics of participants' communication disability for each circumstance of fall

attempting to address an unmet need (e.g., attempting to mobilize independently to get to the toilet) ($n = 42$); (2) the participant was taking a risk (e.g., transferring from the bed to the chair independently) ($n = 50$); (3) circumstances were unknown due to the severity of the participant's communication disability preventing their ability to describe what had happened (e.g., participants were found on the floor with an unknown reason for their fall) ($n = 97$); and (4) staff had reported that the participant had difficulties following instructions ($n = 5$). In total, 27 participants experienced at least one fall in the circumstances of engaging in a behaviour to address an unmet need; 35 participants experienced at least one fall when taking a risk; 31 participants experienced at least one fall in unknown circumstances due to the severity of the participant's communication disability preventing their ability to describe what had happened; and five participants experienced at least one fall when having difficulties following instructions from staff. The characteristics of the participants' communication disability for each circumstance of falls are outlined in Figure 3.

## Fall when the patient is attempting to meet a basic need

Where unmet needs were described as contributing to falls ($n = 42$), these were most often related to toileting ($n = 38$, or 90.5%). In medical records about these falls, nursing staff commonly described participants as being found after a fall needing their personal hygiene attended to, for example: 'Rolled off bed after being faecally incontinent' (P78IR). Staff also documented participants falling whilst attempting to get to the toilet, as in 'Patient found sitting on the floor on his bottom attempting to scoot to the toilet' (P71MR) or participants being found on the floor, as in the following incident report: 'found patient on the floor … incontinent of both' (P24IR).

## Fall when the patient is taking a risk

Documentation about falls when participants taking risks reflected that hospital staff viewed these falls as the responsibility of the participant, as in this note by a medical doctor: 'patient had an unwitnessed fall while tried to mobilise on own with 4WF [four wheeled frame] without calling for RN [registered nurse] help' (P67MR); and in this medical record entry from a nurse describing the circumstances of the fall 'without any discussion, patient lifted himself from armchair and attempted to walk to wheelchair' (P13IR). The majority of falls attributed to the patient taking undue risks occurred during a transfer (e.g., moving from a chair to a bed) and hospital staff described these patients negatively as 'impulsive' and 'non-compliant' as illustrated in the following note written by a nurse 'rang bell for nursing staff but failed to wait for attention' (P60MR).

The medical record also revealed that staff viewed participants as being either frustrated with their progress in their rehabilitation or pleased with improvements in their physical function; and in both circumstances testing their skills (i.e., taking a risk) which resulted in a fall. The incident report by the health professional investigating a fall experienced by participant 13 when testing their skills: 'Patient is aware that he needs assistance to stand but he has been making improvements and wanted to see if he could stand unassisted' (P13IR). Further, when discussing a fall experienced by participant 86 the medical doctor reported 'Unsafe, unsupervised transfer into bed from chair, striking head on bedside table … Pt [patient] says she got up too quickly/frustrated by slow progress'

(P86MR). Often after noting risk taking behaviours in participants, nursing staff in particular described in their medical record entries reminders to the participants to use the call bell to seek assistance, as in 'Patient tried to stand up on his own to go to bed. Stopped and assisted by nursing staff at once. Reminded pt [patient] to ring bell for assistance' (P52MR).

### Unknown circumstances of a fall as fall unwitnessed and patient unable to describe the fall

Of the participants who experienced an unwitnessed fall or were unable to describe the fall, one had mild communication disability and did not speak English and an interpreter was not used to investigate the fall; and another had moderate communication disability and impaired short-term memory impacting on their recall of the fall. Participants were described as being unable to report on a fall or what they were attempting to do in the lead up to the fall, as noted by the health professional investigating the fall in the incident report: 'unable to ascertain event leading to fall as patient is dysphasic' (P4IR) and 'Poor historian? expressive dysphasia … pt [patient] unsure why she fell' (P68MR). Commonly, these participants were found on the floor following their fall by staff during intentional rounding, cleaning or walking past the room. Documentation from staff surrounding these falls describes participants as 'poor' or 'vague' historians.

### Difficulties following instructions to prevent a fall

All five participants who experienced a fall when having difficulties following instructions experienced other falls when attempting to meet a basic need, taking a risk, or with unknown circumstances. In all except one of those falls, participants were described as being unable to follow an instruction from staff to prevent the fall, as illustrated in the following quote from the incident report: 'Due to … language barriers making it difficult to communicate with patient staff witnessing the fall had difficulty preventing patient from reaching forward' (P31MR). Another participant had difficulties following an instruction during a task, as outlined by a medical doctor reviewing the patient: 'Patient had a witnessed fall whilst [transferring] from chair to bed … patient not following a [transfer] instruction' (P68MR). In the remaining fall, the participant had difficulties following an instruction during a therapeutic task with the physiotherapist which resulted in a fall as noted in this description of the fall: 'Patient receptively and expressively dysphasic. Patient misinterpreted therapist instruction and attempted to sit down. Chair too far away. Knee control and therapist strength unable to assist patient to return to standing. Patient gently lowered to floor' (P19IR).

## Outcomes after falls

The vast majority of falls resulted in a physical assessment by a medical doctor, observations by nursing staff for a period of time and an investigation of contributing factors to the fall by the treating team (including nursing, allied health and medical doctors).

### Difficulties with post fall assessment

Medical doctors reported participants with communication disability were difficult to examine, especially those with severe communication disability who were unable to follow instructions or communicate their basic needs. Changes to the participants' neurological status (e.g., orientation, cranial nerve assessment) following a fall were reportedly difficult to assess as illustrated in this entry by a nurse: 'Neuro[logical] obs[ervations] unobtainable … as patient unable to follow instructions' (P65MR). A physical examination for superficial marks or redness on the participant's body was used often to indicate the impact point of the fall where patients were unable to describe the fall as in; 'poor recall of the event … mark on forehead would indicate head-strike' (P67MR) and potential injury was supported by observation of facial expressions and behaviour as illustrated by a nurse: 'Pt [patient] massaging [right] side of temple as if to indicate pain/attempt to relieve pain' (P74MR). Assessment of participants for injury following a fall became more challenging when the participant was not known to the medical doctor performing the examination, or their fall occurred shortly after admission meaning staff were unfamiliar with the participant and unable to determine behaviour changes as a medical doctor reported in the notes 'difficult assessment due to inattention, difficulty following complex instructions and no prior knowledge of pt [patient]' (P68MR).

The treating team's investigation of the circumstances leading to a fall in participants with communication disability was challenging, particularly in falls experienced by participants with severe communication disability. Documentation from staff who either discovered the participant had fallen or were investigating the fall indicated that staff were unable to determine the circumstances, as in: 'Pt [patient] found on floor by nurse. Unable to get history due to aphasia' (P95MR) and 'Patient aphasic after stroke so

difficult to establish why patient moved forward so suddenly' (P79IR). At times, staff speculated on an activity the participant may have been trying to achieve when documenting the fall in the medical record or investigating the fall, for example: 'Appears to have been collecting clothes from the wardrobe and lost her balance' (P74IR) or 'Pt [patient] had unwitnessed fall, seemingly trying to get up to go to toilet' (P64IR).

### Difficulties implementing further falls prevention strategies to address risk

Nearly half of participants (45.8%) experienced multiple falls, 13 participants experienced multiple falls in unknown circumstances, 10 participants experienced multiple falls attempting to address a need, and 10 participants experienced multiple falls taking a risk.

There were 22 participants who experienced falls across more than one of the four factors. Documentation for these participants revealed that there were difficulties implementing further strategies to prevent falls and staff investigating incidents described patients as having 'numerous' or 'multiple' falls and that all fall prevention strategies are currently in place as illustrated in an incident report:

> This is an ongoing problem with the patient rolling from the bed almost daily. All falls prevention strategies in place: floor line bed, crash mats, rounding, high visibility room, bed alarm, toileting plan and family sitting with the patient whenever their schedule allows. Patient has communication and cognitive impairment so is not able to call for assistance when she needs to use the toilet and toileting plan is not capturing all episodes of her need to use the toilet.(P56IR)

Participants who experienced multiple falls were often described in the documentation as 'restless', 'agitated', 'confused' and 'lacking insight' as described by a nurse: 'Pt alert and confused +++ … Pt [patient] became very agitated at 1700 hours. Continually trying to get out of bed. Throwing his legs over [the] side' (P79MR).

Further, for some participants who experienced multiple falls the staff entries following a fall revealed a shift in focus from preventing a fall from occurring to minimizing the harm from a fall. This is described in an incident by a staff member investigating a fall 'All strategies in place to optimize his safety' (P31IR). These instances were often documented as being discussed with the participants' family 'Family aware of ongoing strategies to reduce harm' (P56IR).

## DISCUSSION

This study examined the content of medical records and incident reports on patients with communication disability after a stroke who had experienced a fall. The use of medical record review including patient medical records and adverse event incident reports yielded a relatively large number of falls for a population often excluded from falls research (Hemsley et al. (2019). The findings provide several insights into the ways that hospital staff frame falls risk and prevention strategies for patients with communication disability following stroke and also provide important detail on the falls of patients with communication disability following stroke, according to the Generic Reference Model of patient safety (Runciman et al., 2006).

Previous research has suggested that patients in hospital fall for several reasons including (1) changes to physical function, (2) limited awareness of their physical limitations, (3) a sense of urgency regarding personal care, and (4) a desire to test their skills (Aihara et al., 2021; Haines et al., 2015; Hanger et al., 2014; Weerdesteyn et al., 2008). The reasons for patients experiencing falls in this study are similar. However, the presence of a communication disability in patients following stroke adds additional complexity. The functional implications of a patient's communication disability may mean patients have difficulty understanding the changes to their physical function and their physical limitations due to difficulties with comprehension; and when there is a sense of urgency regarding their personal care there are difficulties attracting the attention of staff and communicating that need. As a result, patients are taking risks that not only lead to a fall, but in the case of personal care, are also experiencing the indignity of soiled clothing or an episode of incontinence (Kitson et al., 2013; Mangset et al., 2008).

Hospital staff considering and documenting other aspects of receptive language impairments (e.g., difficulties following instructions) potentially contributing to falls risk supports prior research identifying a potential link between communication disability and falls risk (Sinanovic et al., 2012; Sullivan & Harding, 2019; Sze et al., 2001). Further, the finding that patients who were unable to communicate their basic needs experienced more than half of the total number of falls supports previous research indicating that patients with severe communication difficulties and low FIM expression scores, specifically a score of less than 4, maybe a risk factor for falls (Salamon et al., 2012; Sullivan & Harding, 2019; Sze et al., 2001). The documents reflected that where patients were unable to attract attention through the call bell or shouting, staff were occasionally able to recognize patterns of behaviour in patients when they needed the toilet; such as fidgeting or becoming restless. Often these behaviours resulted in the bed and/or

chair alarm being activated and thus alerting staff that the patient required assistance. Whilst the use of bed and/or chair alarms for falls prevention have limited effect (Morris et al., 2022), it appears in some instances the bed and/or chair alarm inadvertently provided a way for patients with communication disability to gain the attention of staff to address a need. Whilst the bed and/or chair alarm may provide a useful strategy for patients with communication disability to gain the attention of staff, other methods should also be explored such as single use call bells, door bells, and hand held chimes.

The finding of patients experiencing a fall whilst attempting to address an unmet need is novel. This understanding of the circumstances of falls and the actions of the patient before the fall goes someway to explaining the high falls rates from bed experienced by patients with stroke and communication disability found in Sullivan et al. (2023). However, the findings also reflect that there may be a substantial group of patients with unknown circumstances due to the fall being unwitnessed and the patient being unable to describe the fall. This may mean that it is always going to be difficult to fully determine the causal factors of falls in patients with communication disability, short of surveillance monitoring of these patients when alone.

The documents reflected that staff wrote about patients' communication disability in the time periods before and after a fall, however the aspects of communication disability discussed were not commonly considered in relation to falls risk, falls prevention and as a contributing factor to falls, in particular patients who experience multiple falls. Steel et al. (2019) found that speech pathologists typically used more diagnostic terms to describe communication disability and key information on communication diagnosis or function was not always documented. This study had similar findings to Steel et al. with the descriptions of communication disability provided by speech pathologists aimed at the diagnostic or impairment level and not designed to provide information about the function of communication or how to respond with strategies to help support understanding or expression in everyday care tasks. Additionally, there were few entries containing specific recommendations from speech pathologists for communication in relation to falls risk. The inconsistent documentation of the functional implications of communication disability may have impacts on staff identifying the role of communication disability in falls. The findings provide some evidence of some staff reportedly making specific adaptations to their communication strategies in response to falls, presumably to reduce the patient's risk of falling. However, the lack of consistent and specific recommendations from speech pathologists may mean staff have difficulties communicating effectively with patients in relation falls risk, falls prevention education, understanding the circumstances of a fall, and assessing patients for injury following a fall. Changes to assessment and documentation practices for speech pathologists, such as the increased focus on function and documenting communication strategies for nurses, may go some way to addressing these issues. An increased focus on communicative function and the patient's ability to communicate healthcare needs is also in line with the Australian Aphasia Rehabilitation Pathway (Clinical Centre for Research Excellence in Aphasia Rehabilitation, 2014) and may help the patient and staff to optimize communication to reduce falls risk.

Hospital staff documenting that despite multiple falls prevention strategies being in place (e.g., bed and/or chair alarms, floor line beds) many patients continued to experience falls highlights the difficulties of implementing falls prevention strategies in this population. It appears that the presence of significant physical impairments and added complexity of severe communication disability in these patients made it difficult for staff to implement tailored falls prevention strategies. In this study, communication disability as a risk factor for a fall along with falls prevention strategies were typically identified and managed by physiotherapists, occupational therapists and nursing staff rather than speech pathologists, suggesting that the role of speech pathologists in falls management in this health service was limited. Speech pathologists have expertise in working with patients with communication disability and the inclusion of speech pathologists in falls risk assessment, management, and prevention strategies may provide crucial information regarding the patient's communication disability that may enhance the patient's fall prevention plan. As part of an inter-professional approach, in that all healthcare providers have a role in improving communication, the expanded roles of a speech pathologist may include (1) providing staff with explicit communication strategies to facilitate care (e.g., specific instructions for transfers) (Carragher et al., 2021; Hemsley et al., 2013; Sullivan et al., 2020); (2) providing therapeutic interventions specific to the communication skills of the patient in hospital (e.g., communicating basic needs, gaining attention) (Hemsley et al., 2013; Sullivan et al., 2020); (3) providing adapted falls prevention education suitable for the communication skills of the patient, in a communicatively accessible environment (Briffa, et al., 2022; Hemsley et al., 2013; Stans et al., 2017; Sullivan et al., 2020, 2021); (4) providing alternatives to the call bell; and (5) improving the patient's ability to understand instructions which may include providing therapeutic interventions in conjunction with physiotherapists for example to support communication during transfer training, providing an opportunity for ongoing training to health professionals to communicate with patients with communication disability (Carragher et al., 2021). Speech pathologists could potentially

expand their roles in supporting patients to communicate the circumstances of any falls after the fact using multimodal communication strategies and environmental adaptations and in supporting health professionals to communicate with people with communication disability through staff training (Carragher et al., 2021; O'Halloran et al., 2012; Stans et al., 2017). However, their patients with severe communication may require more than modifications to the environment to support increased monitoring or implementing communication strategies, as these are unlikely to be effective in preventing further falls (Sullivan & Harding, 2019). For these patients, a focus on minimizing harm from falls may be beneficial whilst novel falls prevention strategies are being trialled and implemented.

## LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

There are limitations to the use of patient medical records and incident reports as a source of data about falls. There may be lapses in documentation that mean falls or near miss falls have not been documented and documentation may be illegible or inaccurate, particularly in the case of handwritten medical records such as the records in this study. Furthermore, the use of medical records and incident reports does not account for verbal interactions between staff and patients or between staff members that is undocumented such as interdisciplinary discussions relating to specific strategies to support a patient's communication during transfers, nor does it account for how therapists and staff consider and apply documentation from colleagues (e.g., the implementation of communication strategies during functional tasks). The data source is known to be incomplete, and the sample cannot be considered representative. However, some of the missing or illegible data within this study was addressed using triangulation and matching of medical records and incident reports adding further credibility to the study. Further, given the inpatient rehabilitation setting and participant group is likely to reflect the typical setting and clinical presentation of people with communication disability following stroke, the findings remain applicable to health services providing inpatient rehabilitation services to people with stroke and communication disability.

That the majority of falls described as occurring when patients were taking a risk occurred during a transfer supports previous research by Zdobysz et al. (2005) who suggested that falls during a transfer may arise because the patient is unable to understand verbal instructions and thus take a risk attempting to complete the task independently. Further to this, other studies have suggested that the cognitive difficulties that can occur following a stroke may further impact the patient's ability to understand their risk of falls and recall their functional limitations thus leading them to attempt activities beyond their abilities (Rabadi et al., 2008; Suzuki et al., 2005; Zdobysz et al., 2005)). In addition to this, the cognitive communication difficulties that can occur following a stroke may further impact the patient's ability to use communication aides such as call bells, as well as recall instructions in the correct sequence to complete a task safely. Participants in this study who experienced a fall described by staff as when they were taking a risk were often described in the notes as being 'impulsive', an executive function of cognition. However, specific components of cognitive function and cognitive communication and how they relate to falls risk and the causal factors for falls require further research.

Further research into understanding the views and experiences of patients with stroke and communication disability about their falls may provide further insights into falls in this population. Extending the research beyond analysis of documentation to interviews and direct observations of the ward environment may also provide useful information to enhance prevention strategies, particularly for patients who fall in unknown circumstances, or those who experience multiple falls and have severe communication disability. Further, understanding the views and experiences of health professionals (e.g., nurses, medical doctors, physiotherapists) might provide further context and information regarding the impact of communication disability on falls, including risk, falls prevention strategies and any potential role for speech pathologists in the management of falls in this population.

## CONCLUSIONS

This study examined the content of written documentation from medical records and incident reports relating to communication disability in patients with communication disability following stroke. Risk factors for falls specific to communication disability were identified and documented by physiotherapists and occupational therapists during falls risk assessment, however, communication disability risk factors were noted during the documentation of care by nursing staff. Falls that occurred when patients were attempting to address an unmet need or taking a risk were often related to a patient's difficulties communicating their basic needs, gaining attention from staff, and following instructions. There are challenges for staff in implementing falls prevention strategies with patients who have severe communication disability and experience multiple falls. Further research that examines the nuances of cognitive function and cognitive communication difficulties in relation to falls and research that engages the patients

through interviews and observations may enhance understanding of falls in patients with communication disability and further inform falls prevention strategies.

## ACKNOWLEDGMENT

Open access publishing facilitated by University of Technology Sydney, as part of the Wiley - University of Technology Sydney agreement via the Council of Australian University Librarians.

## CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to report.

## DATA AVAILABILITY STATEMENT

The data are not publicly availably due to privacy or ethical restrictions.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023) 'Patient unable to express why he was on the floor, he has aphasia.' A content thematic analysis of medical records and incident reports on the falls of hospital patients with communication disability following stroke. *International Journal of Language & Communication Disorders*, 1–16. https://doi.org/10.1111/1460-6984.12916

Falls in hospital patients with communication disability.

## Chapter 10: "We don't look too much into the communication disability": Clinicians' Views and Experiences on the Effect of Communication Disability on Falls in Hospital Patients with Stroke.

Chapters 8 and 9 provide evidence contributing to a greater understanding of the circumstances and contributing factors for falls in patients with communication disability following stroke, and suggest ways in which communication disability may contribute to falls. For example, using descriptive analysis of medical records, Chapter 8 reported that the most common type of fall for patients with communication disability after stroke was an unwitnessed roll from a bed. Also, the most common falls prevention strategy documented was the use of equipment. In Chapter 9, the qualitative analysis of medical records and incident reports identified aspects of communication disability that were perceived by hospital staff to contribute to falls. These aspects included difficulty following instructions, gaining attention of staff, and communicating basic needs. Further, Chapter 9 reported the documented challenges of clinicians in providing patient specific falls prevention strategies in these patients.

This chapter provides further context and information regarding the impacts of communication disability on falls management in patients with communication disability following stroke, through the use of focus groups gathering the views of health professionals working with these patients.

This study has been accepted for open access publication in Disability and Rehabilitation. and is used with permission as part of a thesis (Creative Commons CC BY). This study is available at the following link: https://doi.org/10.1080/09638288.2024.2324125. The bibliographic reference is: Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2024) "We don't look too much into the communication disability": Clinicians' views and experiences on the

effect of communication disability on falls in hospital patients with stroke. *Disability and Rehabilitation*

Disability and Rehabilitation

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/idre20

# "We don't look too much into the communication disability": clinicians' views and experiences on the effect of communication disability on falls in hospital patients with stroke

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**To cite this article:** Rebecca Sullivan, Katherine Harding, Ian W. Skinner & Bronwyn Hemsley (03 Mar 2024): "We don't look too much into the communication disability": clinicians' views and experiences on the effect of communication disability on falls in hospital patients with stroke, Disability and Rehabilitation, DOI: 10.1080/09638288.2024.2324125

**To link to this article:** https://doi.org/10.1080/09638288.2024.2324125

DISABILITY AND REHABILITATION
https://doi.org/10.1080/09638288.2024.2324125

Taylor & Francis
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RESEARCH ARTICLE



# "We don't look too much into the communication disability": clinicians' views and experiences on the effect of communication disability on falls in hospital patients with stroke

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**ABSTRACT**

**Purpose:** Difficulty with communicating basic needs and attracting the attention of health professionals may contribute to falls for patients with communication disability after stroke. The aim of this study was to explore the views of hospital-based health professionals on: (a) the effect of communication disability on falls in patients with stroke; (b) falls prevention strategies for patients with communication disability following stroke; and (c) the roles of speech pathologists in the assessment, management, and prevention of falls in this population.

**Materials and Methods:** Online focus groups were conducted and analysed using content thematic analysis.

**Results:** In total, 11 health professionals participated in four focus groups. Clinicians viewed that: (a) the effects of falls in patients with communication disability are far-reaching; (b) communication disability complicates falls risk assessment and falls management; (c) current falls prevention strategies do not meet the needs of patients with communication disability; and (d) strong relationships have a central role in decreasing falls in this population.

**Conclusions:** Health professionals articulate concerning gaps in falls prevention strategies for patients with communication disability. Further research should investigate strategies enabling falls prevention and management to be more inclusive of patients with communication disability following stroke and consider ways in which speech pathologists could contribute to this field.

**IMPLICATIONS FOR REHABILITATION**

- Hospital patients with communication disability after stroke have unique factors that contribute to falls
- Communication disability complicates falls assessment and prevention strategies
- Speech pathologists can assist with identifying contributing factors for falls related to communication disability
- Multidisciplinary teams should consider implementing explicit communication strategies for tasks that are typically associated with falls in patients with stroke

**ARTICLE HISTORY**
Received 22 August 2023
Revised 19 February 2024
Accepted 22 February 2024

**KEYWORDS**
Communication disability; stroke; patient safety; falls; inpatient; falls research

## Introduction

Communication disability, specifically aphasia, apraxia of speech, dysarthria, and cognitive-communication disability, affects an estimated 64% of people with stroke [1, 2]. Patients with communication disability are three times more likely to experience adverse events in hospital, including falls, when compared to patients without communication disability [3]. Falls are one of the most common adverse events in hospital, affecting up to 65% of patients with stroke during their hospital admission, with associated negative outcomes for both the patient and the health service; including injuries and increased costs of care [4, 5].

Effective communication between health professionals and patients is central to providing patient-centred, quality health care [6]. However, the presence of a communication disability can lead to breakdowns in communication between patients and hospital staff [7]. Patients with communication disability following stroke often have difficulties producing and understanding speech and language [8]. These impairments impact communicative function, reducing their ability to (a) convey their healthcare needs (e.g., pain) [9], (b) follow safety instructions [10, 11], and (c) use the nurse call bell [12]. Such communication breakdowns between patients and hospital staff contributes to a three-fold increased risk of adverse events in hospital for patients with communication disability [3, 13, 14].

When considering hospital falls in patients with communication disability following stroke, this group have unique factors that not only contribute to falls but also act as a barrier to falls prevention strategies and the ability of hospital clinicians to provide care following a fall [15–17]. Difficulties following instructions, communicating basic needs, and gaining the attention of staff have been identified as contributing factors for falls in hospital patients with communication disability following stroke [16, 17]. These patients are reported to commonly experience unwitnessed

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falls from the bed whilst attempting to address an unmet need (e.g., go to the toilet), take a risk (e.g., transferring from the bed to chair), or in unknown circumstances (e.g., due to the fall being unwitnessed and the patient being unable to describe the circumstances [16, 17]. Furthermore, documentation by health professionals reflected their view that patients who had difficulties communicating basic needs and following instructions were challenging to assess and examine for injury following a fall [16].

Considering the multiple impacts of falls upon patients with stroke in hospital, health professionals have a crucial role in providing multiple and complex falls prevention strategies. These strategies include providing rehabilitation, delivering patient education, making environmental modifications, and implementing falls systems and policies [18, 19]. However, there is little research focusing upon how health professionals manage falls in patients with stroke and associated communication disability, where there are potentially several barriers to effective communication that impact upon these strategies. The views of health professionals on management of falls in patients with communication disability following stroke might yield important additional barriers or facilitators for implementation that are as yet unexplored. For example, speech pathologists have a key role in working with patients with communication disability and in enhancing communication between patients and healthcare providers [8, 20, 21]. The contribution of speech pathologists in falls assessment and management for these patients needs further research [16, 22, 23].

Hospital responses to the COVID-19 pandemic (2020–2022) placed restrictions upon non-essential research that prevented access to interviewing patients or hospital staff in person. As such, similar research on the problem of falls in patients with communication disability following stroke had relied upon documentary data analysis of medical records and incident reports. There remains a need to understand the views and experiences of health professionals who work with patients with communication disability following stroke to add further context and insight. Such research is important to verify the findings of previous research and generate new knowledge regarding the impact of communication disability on falls risk and prevention strategies [24]. Therefore, the aim of this study was to explore the views and experiences of hospital-based health professionals on (a) the impact of communication disability on falls in patients with stroke; (b) falls prevention strategies for patients with communication disability following stroke; and (c) any potential role for speech pathologists in the assessment, management, and prevention of falls in this population.

## Materials and methods

Online focus groups were conducted with healthcare providers in Victoria, Australia using established methods [25] which did not require modification for the online environment. Data from the focus groups were analysed using content thematic analysis [13, 26] to identify themes within and across the focus groups. This study was approved by the health service Human Research Ethics Committee and the Universities involved and this study is reported following the Consolidated criteria for reporting qualitative research (COREQ) guidelines [27]. Written informed consent was obtained from all participants.

### *Recruitment of participants*

Purposeful and snowballing sampling were used to recruit participants. The researchers distributed notices advertising the research by email through professional networks in local health organisations and posted on social media. Participants were not reimbursed for their time.

Only medical, nursing, and allied health clinicians who had provided clinical services to hospital patients in Victoria, Australia with stroke and associated communication disability; and a fall or near miss fall during hospital admission were eligible to participate.

### *Data collection*

Four online focus groups were held between October and December 2022 *via* Zoom [28], with each focus group lasting between 40 and 50 min (average of 45 min). The Zoom link to the focus groups were accessible to participants and the moderator only and each participant attended only one focus group. No follow-up focus groups were offered. Each group was video and audio recorded in Zoom [28] to enable verbatim transcription later which was completed by the first author. Each participant informed the first author of their preferred date and time to attend a focus group. Composition of the focus groups was dependent on the availability of the participants (i.e., groups were formed by convenience, not by discipline group) to create a group based on what the participants shared in relation to the topic rather than demographics [29].

Each focus group was moderated by the first author. At the start of each group, each participant provided demographic information (first name, role, and number of years working in that role) for context to their discussions; and the moderator introduced herself as a speech pathologist and PhD candidate. To maintain confidentiality, participants did not share their full names or the employer or site of work with the group.

Following introductions, the first author provided participants a 5-min presentation about falls in hospital in this patient group to (a) ensure similar background levels of knowledge across the groups on the recent findings, and (b) provide context to the questions for the focus group discussion. The presentation included two PowerPoint slides providing an introduction to the research, and the published results of systematic reviews, policy analysis and two document data analysis studies (removed references for deidentification). A focus group topic guide was then used to guide discussions (see Appendix 1). The topic guide was informed by the prior research presented to the group [16, 17, 23, 30]. During each focus group, the moderator made field notes to expand on points made by the participants and support data analysis within and across groups [29, 31]. For example, participants in focus groups were asked to provide their views and experiences of a falls prevention strategy raised in a prior focus group. The moderator ensured that each participant had similar opportunities to speak with no single participant dominating discussions, and all participants reflected on their experience within the last two years.

### *Data analysis*

The focus groups were transcribed and de-identified by the first author, with each participant assigned a code reflecting their participant number (e.g., FG1P1 referred to focus group 1, participant 1). Transcripts were imported into MAXQDA Software [32] for storage, retrieval, and analysis of the data. The focus groups were analysed inductively by the researchers within and across groups. Focus group discussions can generate new ideas, and the interaction of participants can lead to them changing their views [33]. Analysis within each of the focus groups conducted in this

study did not reveal evidence of participants changing their views throughout the group discussion. A content thematic analysis was conducted by the first author, in discussion with the research team, using the following process: (a) reading and re-reading the extracted data; (b) applying codes to the data to generate categories of meaning; (c) combining categories of meaning to generate themes in a constant comparison manner between each focus group; (d) developing, refining and verifying the themes; and (e) identifying the relationships by connecting the themes to categories within and across the data [13, 26].

### *Steps to increase reliability*

This study was conducted within a social constructivism paradigm, whereby the researcher seeks the views of the participants in the research, in order to make sense of the meanings they have associated with the experience [34]. Within this, the researcher's own background shapes the interpretation of the data [34]. All authors of the research team have experience working in clinical settings with patients with stroke and had access to the deidentified transcripts as well as the first author's initial interpretations. The authors used the focus group transcripts to inform iterative discussions and ultimately agree and finalise the categories of meaning, themes, and relationships identified within and across the groups. This included consideration of alternative explanations from multidisciplinary viewpoints particularly in relation to the grouping of the content codes into sub-themes and themes, and exploring the relationships between themes.

Two of the 11 participants were known to the focus group moderator through prior working relationships. This potential for bias was managed through the data collection and analysis by: (a) researcher responsiveness during the focus groups (i.e., verifying the meaning of statements throughout the groups, (b) providing context to the discussion for all participants (i.e., the presentation at the beginning of each group), (c) the use of field notes during data collection and analysis, and (d) verification of researchers' interpretations of the data with study participants. A written synopsis of the focus group data was emailed to each participant, including a summary of the themes from the combined groups as well as a summary of the themes arising in their own focus group. In both cases, the themes were accompanied by supporting quotes. Participants were asked to confirm by reply email that the summary was an accurate representation of the discussion, or suggest additions, deletions or expansions on the topics included. Overall, only one participant responded to confirm that the interpretation reflected their group's (Group 4) discussion. Finally, quotes of the raw data are used in the reporting of the results to increase transparency, support the interpretations of the data made by the researchers, illustrate the findings, and increase the plausibility of the results [29].

## Results

### *Participants*

In total, 22 expressions of interest from potential participants were received for the focus groups. The expression of interest did not collect demographic information, only contact details. Each person who expressed an interest was sent a copy of the participant information and consent form *via* email and asked to provide consent to be included in the research. Of the 22 expressions of interest received, only 11 consented to participate in the study. The remaining 11 potential participants were sent one follow-up email inviting participation but did not respond. Participants were six nurses (including one assistant in nursing), three speech pathologists, and two medical doctors ($N = 11$). Participants had an average of 7.4 (range 2 – 19) years of experience in working with people with stroke. Further information about participants is presented in Table 1. Although focus group four ($n = 2$) could be considered a small group interview due to the number of participants, it followed the same format and methods of the other groups and the discussion was similar in duration and format. Therefore, it is considered a focus group for the purpose of this study.

**Table 1.** Participant demographics.

| Focus group number | Participant number | Profession | Number of years of experience in working with people with stroke |
|---|---|---|---|
| 1 | 1 | Nurse | 10 |
| 1 | 2 | Nurse | 10 |
| 1 | 3 | Nurse | 10 |
| 2 | 4 | Nurse | 6 |
| 2 | 5 | Assistant Nurse | 4 |
| 2 | 6 | Nurse | 2 |
| 3 | 7 | Speech Pathologist | 19 |
| 3 | 8 | Doctor | 4 |
| 3 | 9 | Doctor | 5 |
| 4 | 10 | Speech Pathologist | 9 |
| 4 | 11 | Speech Pathologist | 2 |

### *Content themes*

Following analysis, four main themes across focus groups were identified, each with subthemes (see Table 2). The four main content themes answer the aims of the study and the topic guide questions reflecting hospital staff views: (a) the multiple impacts of falls in patients with communication disability are far reaching; (b) communication disability complicates falls risk assessment and management of falls in many ways; (c) current falls prevention strategies do not meet the needs of patients with communication disability; and (d) stronger patient-provider and team relationships play a central role in reducing falls in patients with communication disability. In reporting these results, quotes and excerpts used to illustrate the findings and increase the verifiability and plausibility of the results are labelled according to the participant number assigned during transcription and de-identification (e.g., FG1P1 is focus group 1 participant 1).

### *Theme one: the multiple impacts of falls in hospital are far reaching*

#### *Falls impact patients*

Participants identified that falls have a wide range of impacts on patients. Participants discussed that despite falls with major harm, such as fractures, being uncommon, the impact of a fall on a patient is still significant, and "a total breakdown at times" (FG2P6). Participants viewed that these impacts could affect patients in terms of their confidence, pain, and mental health. Participants also viewed that a fall has negative impacts on the patient's rehabilitation journey.

#### *Falls impact staff*

Participants across all focus groups also viewed that when a patient with communication disability experiences a fall, the staff feel "upset" (FG4P11), and "distressed" (FG4P10). Participants

**Table 2.** Quotes supporting themes.

| Theme | Sub theme | Quote |
|---|---|---|
| The Multiple Impact of Falls in Hospital are Far Reaching | Falls impact patients | "a person can change psychologically" (FG2P6) |
| | | "…if my patient fell then they would need to be transported back to the main hospital, have a scan, … so that takes out of their therapy time the next day, they might not feel 100%, they don't want to do any therapy. I feel like in terms of actually interrupting their rehab journey, it definitely does." (FG4P11). |
| | Falls impact staff | "when you find your patient in that situation [a fall], you need to unite with some other care giver to know … how you go about situations like this. From there you be able to know what to do and to develop your own skill on how to manage situations like that" (FG2P4) |
| | | "I have a negative experience working with them [patients with communication disability] most times… I feel coz when they [the patient's] don't respond very well to me and they don't respond to treatment as well" (FG3P9) |
| | | "And the fact that you know, you've [staff] got to call a loved one to tell them that they've [the patient] had another fall… it's just that disappointing phone call that you have to make" (FG4P10) |
| Communication Disability Complicates Falls Risk Assessment, and Management in Many Ways | Communication disability contributes to falls | "We see it a lot [patients that experience falls] and you know [they] can't communicate their needs and wants… are they actually wanting something and they're trying to reach for it, but unable to use their words to communicate and tell people you know what it is they want? So yeah I definitely think it [communication disability] plays a massive role" (FG4P10) |
| | | "[it is] actually not working because [the] patient they actually challenged when it comes to communicating and they find it hard to talk, they find it hard to understand certain things" (FG1P1) |
| | | "I think it does, maybe the patient could be trying to communicate something, maybe going to the restroom… but there's nobody around to care for him, to direct him to the restroom and then [the] patient is trying to do it on his own. And during that process falls actually happen" (FG1P1) |
| | | "patients get upset because they are having to wait a long time and they're having trouble communicating that they need help so they're more likely to just go and do something themselves" (FG3P7). |
| | Clinicians do not often consider communication disability in relation to falls | "We talked a lot about like cognition and delirium and toileting but we didn't really talk much about communication disability. We did talk about call bell usage" (FG1P2) |
| | | "I saw an email about a meeting that staff were to attend on a falls review … it was clear that it was physios' and OT [occupational therapists] that were the target" (FG3P7) |
| | | "If that person has a communication disability than a speech pathologist needs to be involved in the falls review… but it hasn't been routinely considered" (FG3P7) |
| | It is challenging to understand the circumstances of some falls | "when you approach [the patient who has fallen] you have to look around to see if there's anything maybe there they might have done that could lead to such situations." (FG2P6) |
| | | "I know this is a really tough one because the person, the nurse is not there and I'm trying to take a guess of what really happened" (FG3P9) |
| | It is difficult to assess and treat patients following a fall. | "I have had an instance where I have used like an AAC just like a picture of a person with different dots all over the body and we've gone through each area… looking at each point saying do you feel pain here?" (FG4P11) |
| Current Falls Prevention Strategies Do Not Meet the Needs of Patients with Communication Disability Following Stroke | Patients with communication disability following stroke require tailored falls prevention strategies | "no, I don't think I've ever been involved in education with staff or in the discussion involving a patient." (FG4P11) |
| | | "It might happen occasionally on a case by case basis but it's probably going to be very clinician dependent" (FG3P7) |
| | | "when the patients are getting out of bed maybe to go use the toilet or do anything else they should first be educated and what to do in the process… you can't just get up like that." (FG1P1) |
| | | "you make them understand that they need to walk with you so that everything would go smooth." (FG2P4) |
| | | "[the speech pathologist] are giving orientation on how to go about their day to day activities while they still in the hospital. Let's say they need attention, they've been given this orientation, and how to communicate with a nurse or someone attending to them" (FG1P1) |
| Strong Patient-Provider and Team Relationships Play a Central Role to Decreasing Falls in Patients with Communication Disability Following Stroke | Relationships between the multidisciplinary team | "you need to unite with some other care giver to know ok what happened?" (FG2P4) |
| | | "making sure that if we have specific communication strategies for patients, are they [other staff] actually comfortable using them and can they use them effectively" (FG4P10) |
| | | "doing more collaborative functional assessment, you know when the physio is helping the patient get out of bed, look going and actually looking at their communication in that assessment, looking at you know, how the patient moves, what they're asking for, their communication style… how are they able to communicate so that can inform the strategies we're providing to staff…In summary I think, trying to be more specific with our strategies based on some more specific assessments we're doing collaboratively with our colleagues" (FG4P10) |
| | Relationships between the patient, family, and care team matter | "You need to be very close to your patients, you can understand their body language when you're close to them. And maybe when they trying to talk to you, and you cannot figure out what they're trying to say but most times the body language can tell you a whole lot about what they're trying to relate to you." (FG2P4) |
| | | "As a nurse or a doctor, or a health practitioner, you should be able to have this relationship with your patient. By so doing, they actually feel they are loved… it strengthens them, and they would try their possible best to tell you what the issues are irrespective of their communication disability." (FG2P5) |
| | | "Where things get complicated … it is at times very advisable that you bring a family member that the person is really close to… to help ease the stress of falls or the staff" (FG2P6) |
| | | "Most of the time we don't know the patient 100%. The family knows the patient well. So if a particular strategies doesn't work, I think you should use the family strategy to get at it" (FG3P8) |

reported that when a patient experiences a fall, they often question their management or treatment plans for the patient and consider if any other preventative measures could have been taken to prevent a fall. For example, "you always think, oh my gosh… was that because I didn't speak to the physio about a risk minimisation strategy, or you know I didn't give enough education" (FG4P10). Further, participants reported impacts to their confidence in their roles as health care workers; as described by

FG2P5, who said: "this is complicated… kind of like make you feel like you don't really know what to do or not really good at your job." One participant described the process of reflecting on patient falls as being a learning experience (see Table 2, quote FG2P4), and participants in focus group 1 spoke of the impact of patient falls on the health service in relation to the additional requirements of health services after a patient fall impacting staff workloads. The additional workload was described by FG1P2:

> it's extra work for them [staff] to do, to you know do the assessments, to do the VHIMS [incident report] which takes time off the floor, and you know staff are already short staffed as it is and have time constraints.

### *Theme two: Communication disability complicates falls risk assessment, and management in many ways*

#### *Communication disability contributes to falls*

Across the groups, participants viewed a patient's communication disability as a contributing factor to a fall. FG4P10 said: "I definitely think it (communication disability) plays a massive role." Participants discussed several challenges that are faced in implementing effective falls prevention strategies when patients have difficulty either in expressing their needs to health care workers, or using the call bell to attract attention. Participants expanded upon this using specific examples, such as FG4P10 "they're trying to reach for it, but unable to use their words to communicate and tell people … what it is that they want." FG1P2 further stated "with communication difficulties it's hard to get that message across to the patients that you need to use a call bell if they don't know how to use a call bell." Participants also viewed that the time it takes to communicate with a patient with a communication disability may be a contributing factor to a fall, with FG3P7 explaining: "when someone does have a communication disability it takes so much longer to work out what they need, and hospital wards are really busy environments and staff often don't feel like they have the time to spend" (FG3P7). Speech pathologists in the groups highlighted the role they may have in identifying the communication-related risk factors associated with falls, and FG4P10 specifically outlined how the communication disability impacts on particular hospital tasks:

> … if they [the patient] can't express their wants and needs, how does that … have a functional impact on what they're doing in their day-to-day environment in the hospital? … Having a look at that risk, and then breaking it down a little bit more to sort of understand how that plays out in a day-to-day situation. (FG4P10)

#### *Clinicians do not often consider communication disability in relation to falls*

Participants across the groups acknowledged that a patient's communication disability is "not often considered" (FG3P7) in relation to falls risk assessment or management, even though it "might be a factor" (FG3P7). Participants discussed considering a patient's cognitive impairments (e.g., impulsiveness) and physical function more than communication disability in relation to falls risk assessment and management strategies, with FG1P2 stating that "we talk more about the cognitive impairment and don't look too much into the communication disability." Speech pathologists in the groups suggested that the role of a speech pathologist within the falls prevention and management team needed to include raising awareness of the risks of communication disability in relation to falls and building the skills of other healthcare providers to communicate with patients with communication disability. Also, that "a lot of education and work in this space would actually make a really big impact on the patients" (FG4P11). FG1P2, a nurse, outlined the benefits of a speech pathologist being part of the fall prevention team, explaining:

> The speech pathologist is quite actively involved and contributes really well… that's why I feel like I do a lot of communication strategies is because of their input…I absolutely think there is a place for speech [pathologists] to be involved in falls prevention and really helping to individualise the communication strategies that we should be using. (FG1P2)

#### *It is challenging to understand the circumstances of some falls*

Participants who were nurses highlighted the challenges associated with understanding what might have led to a patient with communication disability having an unwitnessed fall in hospital, particularly when the patient is unable to communicate the circumstances. They discussed trying to figure out what had happened by investigating the environment where the patient was found after a fall, the patients' known falls risk factors, how the patient was positioned when found, and knowledge of the patient's daily routine (e.g., knowing when the patient usually needs the toilet) to help piece together the potential contributing factors to the fall. Participant FG1P2 described this process as "If it's an unwitnessed fall, we're speculating… but at the same time, I'm assessing the other risk factors as well… I'm looking at all of those other intrinsic risk factors… I'm looking at external… what was the environment around them?"

#### *It is difficult to assess and treat patients following a fall*

After a fall, participants, (in particular the medical doctors) reported it was difficult to assess patients with communication disability for injuries following a fall, and described that these difficulties may lead to a delay in commencing treatment. As FG3P8 explained:

> If a patient cannot actually tell what he or she is going through, if he or she can't explain the level of the particular ailment he or she is going through to a doctor, how do you expect the doctor to commence the treatment? … I think the process is not going to go well… the treatment process is also affected.

FG4P11, a speech pathologist described delays to the recognition of a patient who was suffering from an evolving haemorrhage following a fall due to communication disability. Participants variously described their experiences assessing and treating patients with communication disability following a fall as being "complicated" (FG2P5), "frustrating" (FG2P6) and "it can be very daunting task to you know to be able to decipher what this person is trying to relate to you" (FG2P5). However, despite these challenges, participants also described attempting to help patients with a communication disability to describe any injuries; as FG3P8 noted: "we try our possible best… so we can help them improve their health."

Participants also outlined and agreed there is a potential role for speech pathologists following a fall, as described by FG4P7 "I think it's really important that speech pathologists are involved in these falls reviews… because communication [disability] is really pervasive in its effects." Some participants provided examples of what the role of a speech pathologist may include, as described by FG4P10 "… using AAC [augmentative and alternative communication] and not only getting the patient to express if there's any pain or injury after a fall but trying to work out why they

may have fallen." One speech pathologist described using communication strategies and visual aids to support a patient communicate the location and severity of their pain following a fall.

### *Theme three: Current falls prevention strategies do not meet the needs of patients with communication disability following stroke*

#### *Patients with communication disability following stroke require tailored falls prevention strategies*

Participants across all groups agreed that falls prevention for hospital patients with communication disability requires multiple, specific strategies as stated by FG3P7: "[falls are] often multifactorial, so there's not going to be one strategy and that we need multiple, multiple strategies" and should take into account any co-occurring cognitive impairments. Participants described standard falls prevention strategies (e.g., low beds, crash mats, and bed/chair alarms) and also individualised, patient specific strategies that considered the patient's communication disability. These strategies included individualised communication strategies such as using hearing amplifiers, augmentative and alternative communication, and ensuring the environment is personalised and reduces risk of falls; as described by FG4P10: "What are the things they want nearby? What are the things they are constantly asking for, making sure they are in reach."

Participants across the groups explained that the falls prevention education tools available are not usually modified for patients with a communication disability to enable them to comprehend the information. Further, participants discussed the potential for cognitive impairments to be a further barrier to patients being able to participate in falls prevention education. Participant FG3P7 highlighted such barriers to providing falls prevention education in patients with communication disability, particularly aphasia, saying: "We have written information for patients sometimes on strategies that they should be doing, but we never really consider whether it's accessible for the patient. Like can they actually understand what they are supposed to be doing?" FG3P7 also stated that they were unaware of any standard processes to deliver accessible falls prevention education. However, other participants reported individual cases where falls prevention education had been modified to suit a patient with a communication impairment; and recognised that this practice may be occurring on an individual basis using communication strategies suggested by a speech pathologist. FG4P11 said: "I think, (in) most instances, nurses have probably just tried to use them, use those strategies themselves" (FG4P11). Participants viewed that providing patients with falls prevention education specific to their current functional physical ability and adapted with the assistance of a speech pathologist may prevent falls in this population.

### *Theme four: Strong patient-provider and team relationships play a Central role to decreasing falls in patients with communication disability following stroke*

#### *Relationships between the multidisciplinary team*

Participants considered that working as a team of health care workers may help develop effective individualised falls prevention strategies. As FG3P7 explained: "what are the risks of this and what are the situations and how can we apply these strategies, but I guess that requires the team to work more collaboratively rather than in silos." The groups' discussions reflected that (a) working as a team may go some way towards understanding the circumstances of falls when they are unwitnessed; and (b) a speech pathologist may be consulted to integrate the risk management specifically associated with communication disability into the fall prevention plans through collaborative assessments and goal setting. For example, FG3P7 outlined:

> I think even having speech pathologists working with the rest of the team in continence management plans. So, for instance knowing what sort or retraining is happening… and how might communication fit into this. How is a person going to, for instance, request that they need to go to the toilet.

#### *Relationships between the patient, family, and care team matter*

Participants viewed that through developing a relationship with their patient, a level of trust is established which is important to help prevent falls. They described that through a strong relationship with the patient, they are able to anticipate the needs of the patient and this knowledge may potentially prevent falls "knowing what they need at a particular time is very important. So, I think it will go a long way in helping" (FG2P6). Participants explained that a strong relationship demonstrates care and compassion which may help overcome communication breakdowns as described by FG3P9: "you show them care. By so doing you connect with them…they would try their possible best to tell you what the issues are irrespective of their communication disability." Further, clinicians agreed that through relationships, they understood the patient as a person which will help clinicians implement effective falls prevention strategies. Participant FG2P4 described the patient relationship as:

> Everything for me, boils down to a good relationship with your patient… to build trust with them, they trust you in everything they want to do… Relationship matters. Gets you more used to them. Knowing what they need at a particular time is very important…You need to study them to understand why certain prevention[s] works.

Participants' discussions reflected that relationships with the patient's family or friends can assist the team to understand the patient with communication disability to enable them to develop a strong patient-provider relationship as in: "maybe use a particular strategy… and that strategy doesn't work… you should… make enquiries with the family… to know those things your patient like, those things your patient hate and through this I think you can know when to … go a particular different way" (FG3P8). Additionally, participants described family and friends as being able to support falls prevention strategies and communication interactions, by sitting with the patient. They suggested that family and friends would provide comfort and reassurance by talking with the patient, and assist with reorientation to the hospital and any safety instructions by watching them. FG2P6 described the role of family and friends as "very important, both in falls and in communication" further adding "most times you might not always be there to attend to them, so I think sometimes you have to have someone who can keep an eye on them."

Participants agreed that it was the role of the speech pathologist to discuss specific communication strategies with the patients' family and friends, so they were well supported. As FG3P5 said: "the role of the speech pathologist to discuss with the family, ways to help improve the communication." FG3P7 provided a specific example of family members supporting both communication and falls prevention:

> The aphasia was quite a significant factor in her being able to follow information and understand the strategies and safety… it was a matter of having a roster with someone there to also help with really orientating her to the ward and keeping her safe.

## Discussion

The findings of this study support and extend previous research regarding falls in patients with stroke and falls in patients with communication disability following stroke [16, 17]. The study's four main themes contribute new knowledge on hospital-based health professionals' views on falls for patients with communication disability that can be used to inform development of strategies for falls prevention and falls risk management strategies.

The finding that hospital-based health professionals considered falls prevention strategies were difficult to implement supports prior research on the specific aspects of a patients' communication disability that may contribute to a fall in hospital [17, 22]. In particular, the aspects of communication disability described by hospital-health professionals that made falls prevention challenging, were when the patient has difficulties following instructions, using the call bell to gain attention, and communicating needs. That healthcare professionals in this study acknowledged rarely considering these aspects of communication disability in falls prevention management, despite understanding they contribute to falls, indicates a knowledge to practice gap. This gap is not surprising given the recently identified lack of focus on communication disability in hospital falls policy documents [23]. Furthermore, while there is extensive research investigating falls risk screening tools and checklists for patients with stroke in hospital, and these tools are commonly used in conjunction clinical judgement [35–37], communication disability is rarely considered in these tools [23]. The results of this study reflect a similar lack of attention to communication disability, and suggest that communication disability is often not considered during clinical judgement of a patient's falls risk. The results of this study suggest that staff making a note during their falls risk assessment or on the falls risk assessment tool of a patient's ability to follow instructions, use the call bell to gain attention, and communicate basic needs may prompt clinicians to consider these contributing factors to a fall and put in place measures to mitigate the risks. Such consideration could help to then provide a targeted, patient specific falls prevention plan.

Additionally, the finding that speech pathologists have an important role in falls management teams is significant, appearing in most of the themes, in that these professionals may be well suited to fill some of this knowledge-to-practice gap and provide interprofessional education on tailoring falls risk strategies and falls prevention education to patients with communication disability. Considering these findings, it may now be beneficial for hospital falls teams to include speech pathologists alongside occupational therapists and physiotherapists in the assessment and management of falls risk for patients with communication disability following stroke; in that it may assist with (a) identifying contributing factors related to communication disability, and (b) establishing mitigating strategies across a range of activities undertaken in hospital that are typically associated with falls in this population (e.g., toileting and transferring) [17, 30]. This study also holds implications for the practices of speech pathologists working in hospital settings with patients with communication disability following stroke. Previous research has found that the documentation of speech pathologists typically includes diagnostic terms to describe communication disability and information relating to specific functional communication was not always documented [10]. Further, speech pathology documentation rarely contained information specific to falls risk or management [17]. To expedite the input of these professionals into falls risk and management strategies, speech pathologists could apply the findings of their assessments to consider the functional implications of a communication disability on hospital safety (e.g., how does a patient attract attention and communicate to clinicians the need for the toilet?) and provide explicit communication strategies to healthcare providers to inform the safer care of the patient (e.g., providing simple transfer instructions for mobility).

Clinicians in this study considered a patient's communication disability had impacts on the management of the patient following a fall, including identifying any injuries, commencing treatment, and investigating the causes of falls. Communicating with a patient with a communication disability, particularly aphasia, often takes more time than for other patients [38], and breakdowns in communication can lead to delays or impede diagnosis and treatment [9, 39, 40]. The findings from this study support this notion, and suggest that these challenges are amplified in the falls management of patients with communication disability following stroke. The delays in assessment and management of injuries in patients with communication disability following stroke potentially has catastrophic impacts to the patient including delays in diagnosis of fractures and new brain trauma [41]. Training hospital healthcare providers in supporting communication (e.g., through communication partner training) could improve communication between clinicians and patients with communication disability [9, 39, 40, 42]. In particular, providing training for hospital staff communication strategies for patients with aphasia following stroke may enable more effective clinical assessments (e.g., on admission to hospital, or after a fall), improved patient-centred falls prevention plans and more timely investigations and treatment of any injuries following a fall.

The finding that relationships between healthcare providers and the family members of patients with communication disability are a critical part of falls prevention and management is an important one, as it is feasible to achieve as a central pillar of quality healthcare [43, 44]. Clinicians in this study perceived that family and friends might also help hospital staff to understand the likes and dislikes of the patient to develop their relationship, which in turn helped them anticipate the patient's needs, is also important. Particularly as clinicians perceive this relationship as one that may prevent falls. The role of family and friends in hospital falls prevention programs is outlined in many hospital policies [23] and considered part of a comprehensive falls prevention plan [45]. However, reliance on family members and visitors to either communicate on behalf of a patient (e.g., if the patient is unable to speak) or to implement protective strategies against falls [12] is problematic, as they cannot always be available. Additionally, family members find it extremely stressful to be in such a protective position, with vigilance associated with fear when they are not present for the patient at increased risk leading them to exhaustion [12].

Health professionals in this study, also explored the patient-provider relationship as being one that may prevent falls. Relationships between staff and patients provide the foundations for rehabilitation and [8] and when nursing staff attempt to make meaningful connections with their patients, they gain knowledge of individual patients and their personalities [46]. Sundin et al. [47] discussed patient provider relationships developing trust and that when the relationship was strong "the caring became almost obvious" (p315). Health professionals in this study suggested that these meaningful connections and relationships with patients with communication disability may help to prevent falls by establishing trust and knowledge of the patients' needs in advance. While this study's findings reflect the challenging process of communicating with patients with communication disability in relation to falls management, health professionals in this study also reported wanting to know how to help [39, 48]. In Hur and Kang [48] nursing staff reported feeling

guilty when not being able to provide adequate care to patients with aphasia, a finding that is reflected in this study where health professionals experience feelings of guilt surrounding a fall, concerned that the have not provided adequate care to prevent this adverse event. These negative experiences of health professionals and feelings of guilt that surround an adverse event reflect the strength of their relationship with patients. This finding extends the research into the impacts of falls in that these impacts (49] extends beyond the patient and health service to the clinicians themselves.

In the context of a multidisciplinary approach to falls prevention, a consistent gap identified by participants was the provision of falls prevention education in a format that is accessible to patients with communication disability, something speech pathologists have the skills and knowledge to facilitate [6]. Falls prevention education is an intervention known to be effective in patients undergoing rehabilitation [50] and patients with stroke should be provided with information regarding stroke and recovery that meets their needs, given patients may not understand their physical limitations potentially leading to falls [51, 52]. Speech pathologists have specialist skills in adapting communication to suit the needs of patients with communication disability and providing adapted education to patients with a communication disability may empower patients, and potentially prevent falls. However, there are known barriers to delivering education that has been adapted to suit the needs of patients with communication disability, one of which is interdisciplinary practice to develop the resources required [53–55]. Briffa et al. [53] suggested there was a need for greater collaboration between speech pathologists and other disciplines in order to provide accessible information on a range of topics relevant to stroke and recovery. Given falls prevention is a high priority for hospitals, and the significant number of patients in hospital with communication disability following stroke [2], it would be reasonable to consider this as an urgent gap in practice for speech pathologists to address. An important consideration to this approach would be the limitations of delivering education to patients with cognitive impairment, given that falls prevention education offers limited benefits to patients with cognitive impairments [50, 56]. Research on making information accessible for patients with cognitive impairments is also required.

The challenges associated with understanding the circumstances of unwitnessed falls in hospital in patients who are unable to communicate the circumstances may explain findings from other studies that report patients with severe communication disability often experience multiple falls with unknown circumstances [16, 17]. Clinicians in this study discussed using multiple strategies to assist in identifying the causes and contributing factors for falls in these patients, however, despite these strategies the circumstances of some falls remain unclear. Identification of the missing factors in the causes and contributing factors enables effective root causes analysis of falls [57] leading to more patient-centred prevention strategies [50, 58, 59]. Further, the perceptions and experiences of the patient about their falls appears to be a key detail in the falls analysis that is missing for patients with communication disability following stroke. The difficulties establishing the causes and contributing factors for falls in patients with communication disability following stroke potentially leads to the reliance on generic strategies which focus on what clinicians are speculating as the most pertinent factors [58].

### *Limitations and directions for future research*

The results of this relatively small study should be interpreted with caution and cannot be taken to reflect the views of all healthcare providers in all hospital settings. This study was conducted with participants from one state in Australia, and there may be variations in the falls assessment and management of patients with communication disability in other health services. Further, the participants were primarily from the nursing profession and the participation of a wider range of health professionals, particularly physiotherapists and occupational therapists, may have provided additional insights into the impacts of falls on health professionals. The inclusion of these professions to a greater degree might have yielded new insights into how communication disability contributes to falls prevention and management; and their roles within the multidisciplinary team supporting these patients and there is a need to explore their views further. However, the patient population discussed is common across hospitals, therefore the findings are likely to apply to other health services. While rigorous techniques were used to form the researchers' interpretations and the findings, this was only verified by one participant confirming the interpretation of the discussion for their focus group.

While important, the views of healthcare professionals are not sufficient to understand the ways that the patient-provider relationship might impact upon falls or fall-prevention strategies. Further research should be undertaken to obtain the views of patients with communication disability following stroke, who have fallen in hospital, and their family members who have witnessed a fall specifically exploring the content themes within the findings of this study. Observational research (i.e., observing patients in hospital) is also indicated so as to identify what might be occurring for those patients with communication disability who have unwitnessed falls, or who are unable to explain what has happened in a fall; as hospital staff in this study outlined 'speculating' about what factors had led to the fall. Future research should: (1) investigate ways to include the specific aspects of communication disability identified as contributing factors to falls into falls risk screening and assessment tools; and (2) evaluate the potential benefits of falls prevention education materials that are tailored for patients with communication disability and empower patients to be a part of their fall's prevention plan. These areas of research may lead to improvements in the falls incidence rate and management plans for patients with communication disability following stroke through mitigation of these risks.

## Conclusion

Healthcare providers working with hospital patients with communication disability following stroke identify that communication disability complicates both falls assessment and prevention strategies. However, they also perceived that communication disability was not often considered in falls risk assessment or post fall reviews. Patients with communication disability following stroke require a team approach to implement multiple, patient specific falls prevention strategies to integrate the risk management specifically associated with communication disability and strong patient provider and family relationships. Indeed, strengthening care relationships could be an important factor in preventing falls for this patient group. Further, healthcare providers working with hospital patients with communication disability following stroke perceive that falls in this population are complex and management of these falls is personally and professionally challenging. However, this study also suggests that there are gaps in hospital falls prevention and management strategies for patients with communication disability. Further research should investigate strategies that may contribute to enhanced falls prevention and

management for patients with communication disability following stroke, and consider the potential contribution for communication specialists (i.e., speech pathologists) in this field.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## Funding

This research has been funded by an Australian Government Research Training Program Scholarship and a Jumbunna Postgraduate Research Scholarship.

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## Appendix 1

***Questions about falls in this group***

1. When a patient with communication disability falls, what's the impact of that fall on them and on you as staff?
2. In your view, does the patient's communication disability play any role in the fall, or not, can you explain your views on this?

***Questions about falls prevention***

3. What strategies help to prevent falls in patients with communication disability?
4. Is falls prevention education delivered to patients with communication disability? Can you describe how this happens and its impact?
5. What about when strategies don't work. What gets in the way of falls prevention strategies working for this group?

***Question about role of speech pathology***

Speech pathologists are not typically involved in falls prevent programs. In the medical notes, they rarely wrote about the person's everyday communication with nurses, they tend to write about impairments and diagnosis.

6. What are your views on the role of speech pathology expanding to help prevent falls of these patients? Do you have any examples of this already happening?

***Question about incident reporting***

7. Patients with communication disability can have trouble explaining what happened when they fall. Can you give me an example of a time that you needed to write an incident report for patient with communication disability who fell, and how you worked out what happened?

Is there anything else you would like to add?

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## Chapter 11: "Communication disability plays a massive role." Clinical Implications and Recommendations for Management of Falls in Hospital Patients with Communication Disability After Stroke

The chapters within this thesis have explored the falls of hospital patients with communication disability after stroke. Chapters 2, 3 and 4 highlighted the limitations in the literature regarding any certainty of an association between communication disability as a non-specific category, and an increased risk of falls in hospital; the gaps in knowledge relating to contributing factors, circumstances and outcomes of falls; and the gaps in hospital falls policies in relation to patients with communication disability. Chapters 8 and 9 revealed that patients with communication disability following stroke commonly experience unwitnessed falls from bed, and that aspects of communication disability following stroke were reported as risk and contributing factors to these falls. Further, these two chapters reported on falls where the contributing factors and circumstances were unknown as the fall was unwitnessed and the patient was unable to describe the fall due to their communication disability. Both chapters also reported on the difficulties health professionals faced in falls prevention for this population. Chapter 10 used health professional focus groups to provide further context and information to these findings. This chapter reported that health professionals perceive that communication disability complicates falls management but is not often considered in risk assessments or post fall reviews. The health professionals reported a range of strategies that may prevent falls in patients with communication disability following stroke.

Chapter 11 synthesises the findings from Chapters 2, 3, 4, 8, 9 and 10 to present evidence-informed guidance for health professionals to manage falls in patients with communication disability following stroke, including suggestions for assessment and

prevention strategies. This chapter is presented as a manuscript in preparation for submission to a journal for consideration of publication.

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## Abstract

**Background:** Falls in hospital are a common patient safety incident after stroke. However, despite the impact of communication disability following stroke on hospital falls management, there is a significant and important gap in the literature. There is also little guidance for health professionals to implement appropriate falls prevention strategies for this population.

**Objectives:** To provide a synthesis of findings across a selected set of related studies on falls in hospital patients with communication disability following stroke, and guidance for health professionals to enhance falls prevention strategies for this group.

**Methods:** A qualitative meta-synthesis of six integrated studies using a content thematic analysis to identify common themes.

**Results:** Research examining the falls of patients with communication disability after stroke reveals that despite the impact of communication disability on falls, communication disability is not visible in falls research, hospital policies or clinical management. Aphasia is the most common communication disability in patients who commonly experience unwitnessed rolls from bed. Suggestions for falls prevention include involving family members, tailored falls and stroke education programs and improved documentation of the functional impacts of communication disability.

**Conclusion:** In recognizing the nature of falls and impacts of communication disability on falls and the nature of falls in patients with communication disability following stroke, health professionals could provide more targeted, patient-specific falls prevention plans. Further research including patients with communication disability following stroke could provide important insights to their falls and falls management. Research examining the effectiveness of falls prevention strategies for this group is indicated.

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**Keywords:** falls, communication disability, patient safety, stroke

Falls in hospital patients with communication disability.

## Introduction

Falls are one of the most common patient safety incidents to occur after a stroke (Denissen et al., 2019). Despite the relatively low occurrence of severe injury associated with falls, these patient safety incidents remain a persistent and challenging problem for patients, staff, and managers in hospitals (M. E. Morris et al., 2022; Sullivan, Hemsley, Skinner, et al., 2023) (Chapter 4). However, there is a significant and important gap in the literature relating to falls in patients with communication disability following stroke: these patients are often excluded from falls research either through participant exclusion criteria (e.g., not being able to speak) or a lack of specific reporting on the details of participants with communication disability (Hemsley et al., 2019; Sullivan et al., 2020) (Chapter 2). Overall, there is scant mention of patients with communication disability in falls prevention policies (Sullivan, Hemsley, Skinner, et al., 2023) (Chapter 4). As a result, there is little guidance for health professionals and hospital staff more broadly to enable appropriate falls prevention strategies for hospital patients with communication disability following stroke (Sullivan et al., 2020) (Chapter 4).

There is good reason to focus on the falls of patients with communication disability, given that (a) up to 88% of patients have a communication disability following stroke (C. Mitchell et al., 2020; O'Halloran et al., 2009), and (b) they are three times more likely to experience an adverse event in hospital (Bartlett et al., 2008). While a meta-analysis of studies looking at the relationship between falls and communication disabilities did not find a clear relationship, there is some evidence to suggest that patients with severe communication disability are at higher risk of falls compared to those who can communicate their needs (Sullivan et al 2020) (Chapter 2). Indeed, Sullivan and Harding (2019) reported that patients with severe communication disability (i.e., those who are unable to communicate their basic needs) were twice as

likely to fall in hospital than patients who were able to communicate their basic needs. Furthermore, prior research demonstrates that various aspects of communication disability contribute to falls; specifically, difficulties following instructions, attracting attention of staff, and communicating basic needs. (Sinanovic et al., 2012; Sullivan et al., 2020) (Chapter 2).

Recently, six studies on the falls of patients with communication disability following left hemisphere stroke included data from medical records, incident reports, and focus groups with hospital health professionals; all analysed inductively with an analytic lens of the Generic Reference Model (W. B. Runciman et al., 2006; Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023; Sullivan et al., 2024) (Chapters 2, 3, 4, 8, 9, 10). The six studies moved sequentially, building from a systematic review of the literature and policy review on falls in hospital, to analysis of medical records and incident reports, and focus group studies. This body of research enabled an in-depth understanding of falls in patients with communication disability following stroke. As each study in the sequence informed design of the next, it is important to consider the studies as a group to assist translation into policy and practice actions.

Qualitative meta-synthesis studies involve analysing, synthesising, and interpreting the results from a group of related studies to build an evidence base that assists in greater translation and transferability of the research than the individual studies alone (Finfgeld-Connett, 2018; Major & Savin-Baden, 2010). A qualitative meta-synthesis can culminate in a series of recommendations designed for implementation to improve patient care and strengthen a cohesive translation of the findings in a complex area of practice seeking to address a persistent problem (Finfgeld-Connett, 2018; Major & Savin-Baden, 2010).

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Therefore, the aim of this meta-synthesis is to: (a) synthesise the findings of an integrated set of studies reporting on the nature of and circumstances surrounding falls in hospital patients with communication disability following left hemisphere stroke, and (b) provide health professionals, managers, and policy makers with implications and guidance to reduce falls, improve the care, quality, and safety of hospital patients with communication disability following stroke.

## Method

### Approach to the Qualitative Metasynthesis

A qualitative metasynthesis was used to combine, triangulate, and synthesise findings from a group of six related and integrated studies (Sullivan et al., 2020, 2021; Sullivan, Hemsley, Skinner, et al., 2023; Sullivan, Harding, Skinner 2023, Sullivan, Hemsley, Harding et al., 2023; Sullivan et al., 2024) (Chapters 2, 3, 4, 8, 9, 10). Each study was undertaken with the aim of understanding the relationship between falls and communication disability to inform improved care quality and safety for people with stroke and associated communication disability in hospital. The characteristics and main findings of the studies contributing data to the metasynthesis are presented in Table 1. These studies were conducted sequentially, each informing the next and building upon the previous studies as a line of inquiry (Major & Savin-Baden, 2010). Viewing the included studies as a line of inquiry allowed the researchers to build and present a metasynthesis that is grounded in the findings of the individual studies and to identify the themes that connect studies in the group (Major & Savin-Baden, 2010). For clarity of reporting, each study has been given a number (e.g., Study 1), the details of which can be found in Table 1.

**Table 1**

*Authors, Study Number, Title, Aims, Methods, Main Findings of the Studies in the Meta Synthesis*

| First author, year | Study Number | Title | Aims | Methods | Key findings |
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| Sullivan, 2020 | 1 (Chapter 2) | Falls in hospital patients with acquired communication disability secondary to stroke: A systematic review and meta-analysis | To determine the association between communication disability secondary to stroke and falls in people with stroke in hospital. | Systematic review with narrative synthesis and meta-analysis | • Three studies report an increased risk of falls in patients with communication disability after stroke.<br>• Meta analysis showed no statistically significant association between non-specific classification of communication disability and increased of falls.<br>• Some studies reported a higher risk of falls may be associated with severe communication disability.<br>• Half of the studies excluded participants with severe stroke who were non mobile or were unable to communicate or understand instructions. |
| Sullivan, 2021 | 2 (Chapter 3) | Circumstances and outcomes of falls in hospital for adults with communication disability | To determine the circumstances and outcomes of falls in hospital patients with communication | Qualitative synthesis – secondary analysis of studies | • The inclusion of participants with communication disability ranged from 9 – 68%.<br>• Intrinsic factors to falls were investigated with little in common. |

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| | | secondary to stroke: A qualitative synthesis | disability secondary to stroke, including factors leading up to, occurring during, or following a fall. | in the systematic review | • Falls typically occurred in the patient's bedroom, during the day and during transfers.<br>• Reported outcomes of falls was variable and included injury and increased length of stay.<br>• No studies specifically reported on the circumstances and outcomes of falls in patients with communication disability after stroke.<br>• Family members may provide protection from falls for example by providing reminders to use the call bell |
| Sullivan, 2023 | 3 (Chapter 4) | Hospital policies on falls in relation to patients with communication disability: a scoping review and content analysis | To determine how to content of hospital falls policies relate to patients with communication disability and to identify gaps in policy that need to be addressed. | Scoping review and content analysis | • Communication disability is not consistently identified on falls risk assessment and screening tools; however, aspects of communication disability are subsumed into the cognitive domains.<br>• All policies suggested patients be involved in falls prevention plans and receive education about risk and prevention strategies. However, the patient information reviewed was not modified for |

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| | | | | | patients with a communication disability.<br>• Family members may have a role in preventing falls.<br>• The role of speech pathology is unclear. |
| Sullivan, 2023 | 4 (Chapter 8) | Falls in patients with communication disability secondary to stroke | To examine the falls of patients with communication disability following stroke, including the circumstances, contributing factors, and outcomes of the fall. | Mixed methods medical record and incident report review – descriptive analysis using the Generic Reference Model (Runciman et al., 2006) | • The majority of patients had a severe or profound communication disability.<br>• Aphasia was the most common type of communication disability.<br>• Patients also typically needed assistance with activities of daily living, were non-ambulant and incontinent.<br>• The most common type of fall was an unwitnessed roll from bed, with the patient found on the floor by staff.<br>• Patient factors contributed to the majority of falls including balance impairments, changes in medical condition and mobility impairments.<br>• The provision of equipment was the most common falls prevention strategy used.<br>• Injuries occurred in 15% of falls and impacts to the hospital system |

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| | | | | | included additional cost and staffing. |
| Sullivan, 2023 | 5 (Chapter 9) | "Patient unable to express why he was on the floor, he has aphasia." A content thematic analysis of medical records and incident reports on the falls of hospital patients with communication disability following stroke | To examine hospital medical records and incident reports relating to falls of patients with communication disability following stroke for content codes, categories, and themes relating to communication. Medical record and incident report reviews | Content thematic analysis of medical record and incident reports. | • The majority of participants had a severe or profound communication disability and aphasia was the most common type of communication disability.<br>• Hospital staff viewed that patient having difficulties following simple instructions as a risk factor for a fall as well as other elements of impaired receptive language.<br>• Difficulties gaining the attention of staff and communicating basic needs were contributing factors for falls and related to patients falling when attempting to address an unmet need or taking a risk.<br>• Falls occurred when the patient was having difficulties following an instruction.<br>• There were falls where the circumstances were unknown due to the fall being unwitnessed and the patient unable to describe the fall due to communication disability.<br>• Difficulties with post fall assessment of injury and |

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| | | | | | implementing falls prevention strategies due to communication disability were noted |
| Sullivan, 2024 | 6 (Chapter 10) | "We don't look too much into the communication disability": Clinicians' views and experiences on the effect of communication disability on falls in hospital patients with stroke. | To explore the views of hospital-based health professionals on (a) the effect of communication disability on the falls in patients with stroke; (b) falls prevention strategies for patients with communication disability following stroke; and (c) the roles of speech pathologists in the assessment, management, and prevention of falls in this population. | Content thematic analysis of clinician focus groups | • Communication disability after stroke complicates both falls assessment and prevention strategies<br>• Communication disability is not often considered in falls risk assessment or post fall reviews.<br>• Patients with communication disability following stroke require multiple, patient specific falls prevention strategies that integrate the risk associated with communication disability and include strong patient-provider and family relationships.<br>• Falls in this patient population are complex and personally and professionally challenging. |

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### Data Analysis and Synthesis

Initially, the first author conducted a content thematic analysis across the results of all the studies (Elo & Kyngäs, 2008; Major & Savin-Baden, 2010). This involved reading and re-reading the results of each study, extracting the component content categories and themes already reported, and identifying categories of meaning, noting any that appeared repeatedly across the studies (Major & Savin-Baden, 2010). Through this process of engagement with each study's findings, and the common categories and themes common across studies, the authors also considered any relationships between these categories of meaning that might help to explain the findings (Major & Savin-Baden, 2010). Finally, the categories of meaning and content themes were combined in one 'set' as a synthesis of findings in relation to falls in hospital patients with communication disability following left hemisphere stroke. To verify the interpretation, the first author coded and discussed these content categories and overall analysis with the final author to check if all findings had been represented in the over-arching synthesis of the findings and adjustments made to the categories and themes based on consensus. Finally, all co-authors of the component studies (representing the disciplines of speech-language pathology, occupational therapy, and physiotherapy) and of this synthesis met to discuss the findings, make any final adjustments, and agree on the implications and guidance.

## Results

Across the six studies, there were four main content themes, each integrating with and connecting in various ways with the others: (a) an invisible problem: communication disability is invisible and not properly considered in research and falls management; (b) painting the picture: the nature of communication disability and falls; (c) a complex problem: the multiple impacts of communication disability on falls

management; and (d) the way forward: potential falls prevention strategies to improve care. Figure 1 depicts the interconnectedness of these themes, providing context to the individual theme presented. For example, to consider communication disability in research and falls management, full appreciation should be given to each and all themes. The contributions of each study towards the metasynthesis of are presented in Table 2. The integration of the themes relating to the multiple impacts of communication disability on falls in patients with communication disability is illustrated in Figure 2, which also outlines the studies contributing findings to each theme.

**Table 2**

*Content Themes, Contributing Study Numbers, and Categories of Meaning in the Studies in the Metasynthesis*

| Content Theme | Study Number | Categories of meaning |
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| An Invisible Problem: Communication disability is invisible and not properly considered in research and falls management | 1 (Chapter 2) | • Low inclusion rates of patients with communication disability across the included studies (9.8-68%)<br>• Poor reporting of assessment, diagnosis, and severity of communication disability<br>• Exclusion criteria across some studies means patients with severe stroke are excluded |
| | 2 (Chapter 3) | • Low inclusion rates of patients with communication disability across the included studies (9.8-68%)<br>• No studies specifically report on the circumstances or outcomes for falls in patients with communication disability following stroke |
| | 3 (Chapter 4) | • Limited consideration of communication disability on assessment and screening tools<br>• Aspects of communication disability (e.g., ability to follow instructions) is subsumed into the cognitive domains of falls assessment/screening tools<br>• No adaptations for patients with communication disability to understand falls prevention education |
| | 4 (Chapter 8) | • Impaired receptive language is described using cognitive terms by staff<br>• Patients who experience multiple falls were described using terms related to cognitive impairment |
| | 6 (Chapter 10) | • Communication disability is not considered in relation to assessment or management, cognitive and physical impairments are more routinely discussed<br>Falls prevention education is not modified to suit patients with communication disability and there are no standard processes to provide this education |
| Painting the Picture: The nature of | 1 (Chapter 2) | • Aphasia most common type of communication disability reported among patients who fell<br>• No increased risk of falls with a non-specific classification of communication disability<br>• Individual studies with increased risk of falls in patients with severe communication disability |

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| communication disability and falls | 2 (Chapter 3) | • Falls most commonly occurred during the day, in the patient's bedroom |
| | 4 (Chapter 8) | • Aphasia was the most common type of communication disability reported among patients who fell<br>• Most patients had a severe (56%) or profound (6.4%) communication disability<br>• Majority of patients had other stroke related impairments<br>• Falls occurred across the day and night, in the patient's bedroom, and were an unwitnessed roll from bed<br>• Nearly half of the patients experienced multiple falls |
| | 5 (Chapter 9) | • Aphasia was the most common type of communication disability reported among patients who fell<br>• Most patients had a severe or profound communication disability (69.4%)<br>• Majority of patients had other stroke related impairments<br>• Falls occurred when patients were attempting to address a need, taking a risk or having difficulties following instructions<br>• Nearly half of the patients experienced multiple falls |
| A Complex Problem: The multiple impacts of communication disability on falls in patients with communication disability following stroke in hospital | 3 (Chapter 4) | • Difficulties following instructions is identified on falls risk screening tools |
| | 4 (Chapter 8) | • In 32% of falls, a contributing factor; was not identified as the patient was unable to describe the fall due to severe communication disability, and the fall was unwitnessed |
| | 5 (Chapter 9) | • Staff documentation in the medical record and incident report identifies that communication disability is a contributing factor to falls<br>• Staff documentation in the medical record reflected their view that the patient's difficulties following instructions was a risk factor for some falls<br>• Elements of impaired receptive language were identified by staff as potentially impacting on falls risk<br>• Staff documentation reflected their views that the patient's difficulties gaining attention, communicating basic needs, and following instructions contributed to the patient's |

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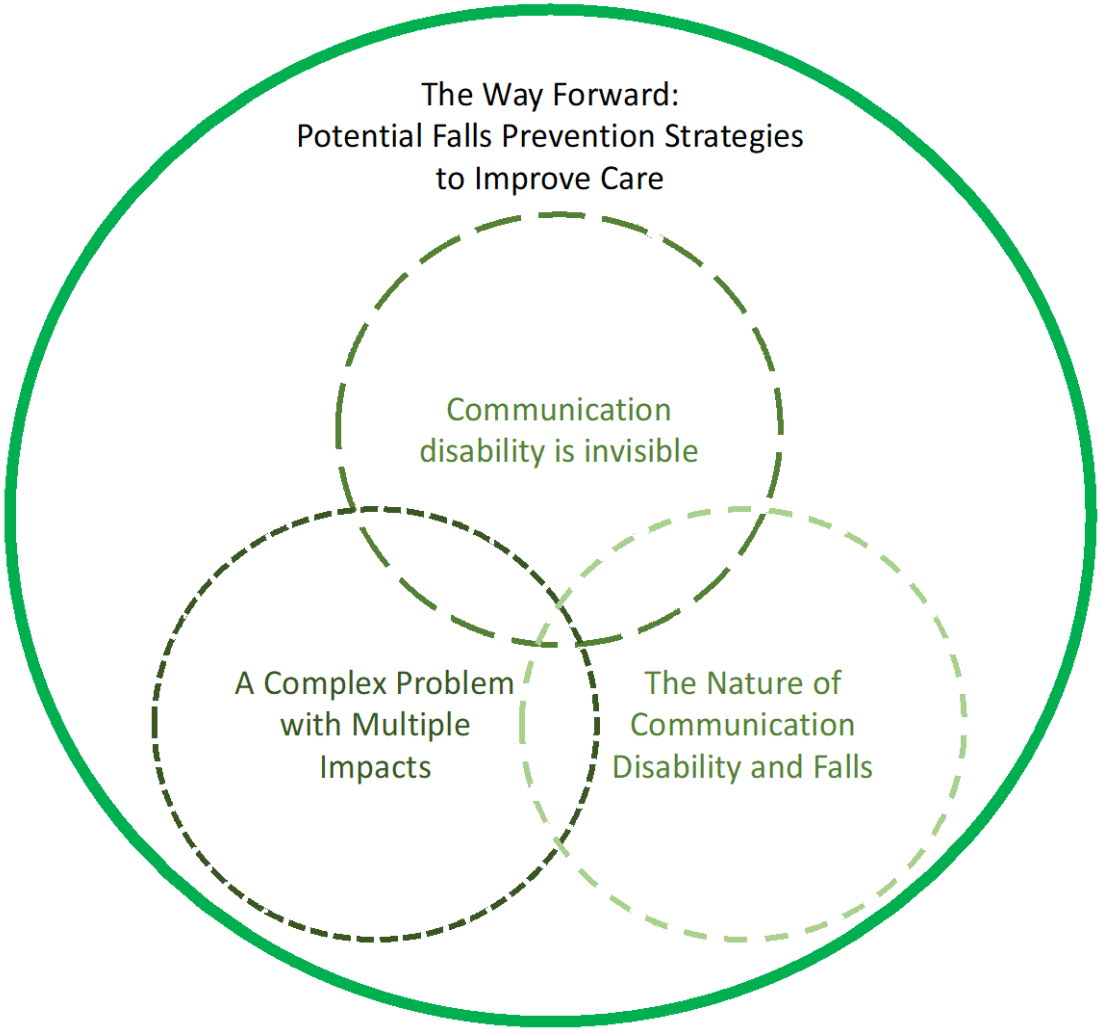
| | | • Difficulties identifying the circumstances of falls as the patient was unable to describe the fall due to severe communication disability and the fall was unwitnessed<br>• Difficulties with post fall assessment of injury in patients who have difficulties communicating basic needs and following instructions |
| | 6 (Chapter 10) | • Staff view that communication disability contributes to falls<br>• Staff view that it is difficult to identify the circumstances of falls when the patient is unable to describe the fall due to severe communication disability and a fall was unwitnessed<br>• Staff find it difficult to conduct post fall assessment of injury in patients who have difficulties communicating basic needs and following instructions |
| The way forward: potential falls prevention strategies to improve care. | 2 (Chapter 3) | • Family members provided protection against falls |
| | 3 (Chapter 4) | • Policy documents outline that falls prevention education should be provided to all patients or family members if the patient is unable to participate<br>• Policy documents outline that family members should take an active role in falls prevention when the patient is unable to do this for themselves |
| | 4 (Chapter 8) | • Family members may provide supervision to help prevention falls<br>• Falls prevention strategies currently used include floor line beds, bed/chair alarms and high visibility rooms |
| | 5 (Chapter 9) | • Physiotherapists and occupational therapists documented using adaptations to communication during high-risk tasks<br>• Medical record entries suggest staff have difficulties implementing falls prevention strategies, particularly for patients who experience multiple falls |
| | 6 (Chapter 10) | • Current falls prevention strategies are not meeting the needs of this population<br>• Speech pathologists could contribute more to falls prevention by identifying and documenting the specific communication disability risk and contributing factors for falls; integrating the risk into falls prevention plans; raising awareness of the influence of communication disability on falls; and using augmentative and alternative communication to assist the patient to communicate injuries or the circumstances of falls.<br>• Falls prevention needs to be multifactorial and consider communication disability |

| | | |
|---|---|---|
| | | • Falls prevention needs to consider co-occurring cognitive impairments<br>• Multidisciplinary teamwork is required to develop effective, individualised falls prevention strategies and understand the circumstances of falls, where the patient has severe communication disability and the fall is unwitnessed<br>• Strong relationships with patients may help anticipate the needs of the patient<br>• Family members may help to implement falls prevention strategies |

**Figure 1**

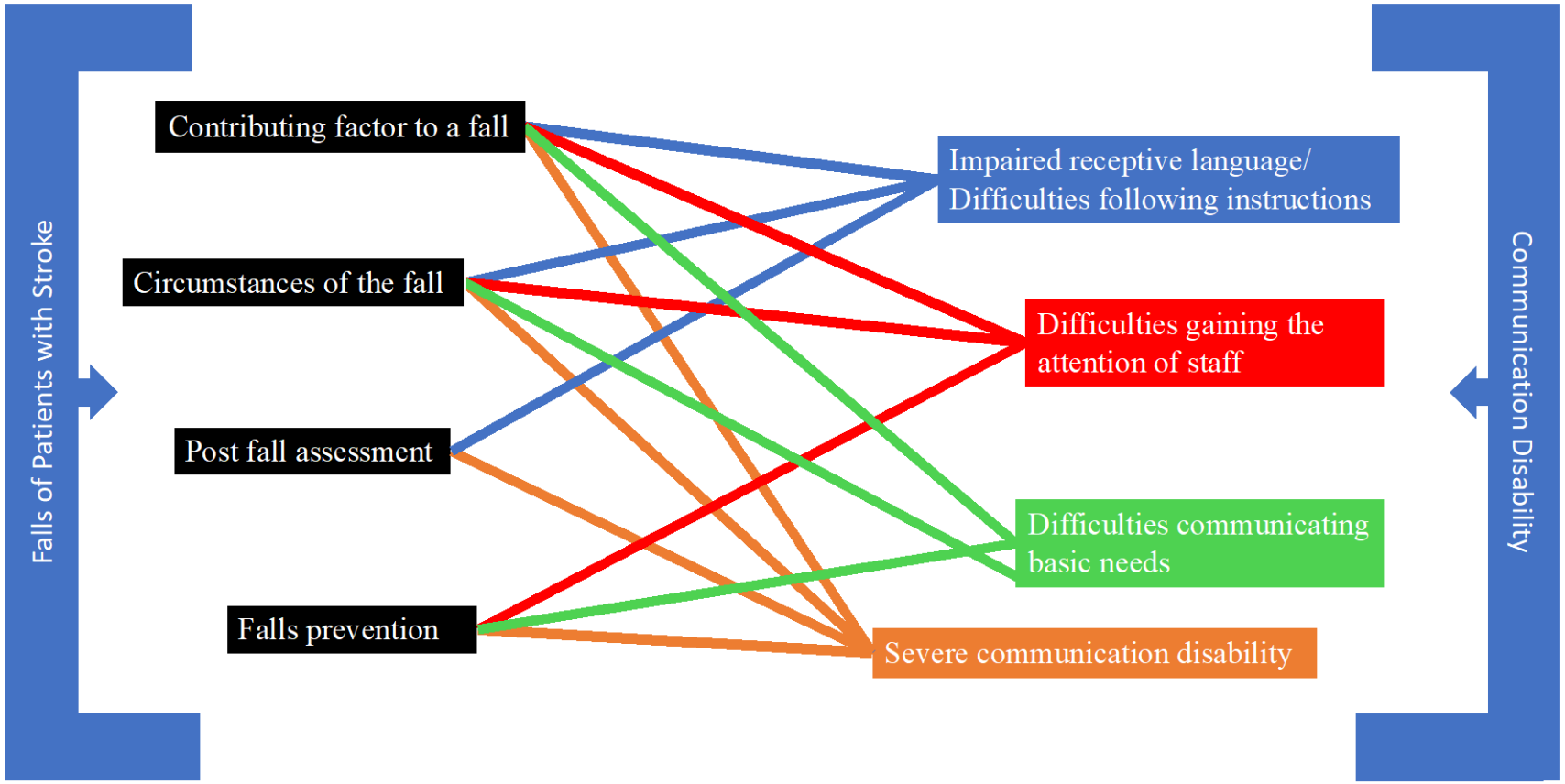
*Interconnection of Themes Across the Studies*



Falls in hospital patients with communication disability.

**Figure 2**

*The Multiple Impacts of Communication Disability on Falls in Patients with Communication Disability Following Stroke in Hospital*



Falls in hospital patients with communication disability.

### An Invisible Problem: Communication Disability is Invisible and Not Properly Considered in Research and Falls Management

The studies' findings reflected that communication disability was not always properly considered in the assessment, management, and prevention of falls in patients with communication disability following stroke. Furthermore, elucidation of a patient's communication skills or function and the role of this in the patient's fall is often lacking. The findings of the systematic review (Study 1) and qualitative metasynthesis of studies (Study 2) suggests that communication disability following stroke has not yet been adequately considered in research relating to the falls of patients with stroke. This is evident by the relatively low inclusion rates of participants with communication disability in these studies, little reporting of the assessment and severity of the participant's communication disability, and minimal adaptations to the study design to facilitate their inclusion (Sullivan et al., 2020, 2021) (Chapter 2 and 3).

Further contributing to this theme, in Study 3 Sullivan, Hemsley, Skinner et al., (2023) (Chapter 4) reported that patients with communication disability are not represented in hospital policies and documents that concern falls, including the accessibility of falls prevention education documents aimed at patients. Aspects of communication disability, in particular difficulties with receptive language (i.e., understanding concepts, word meanings, sentence structures and grammar) and following instructions (e.g., involving simple or increasingly complex sentences), are identified in some falls risk screening and assessment tools; but often inappropriately conflated with cognitive difficulties (Sullivan, Hemsley, Skinner, et al., 2023) (Chapter 4). Substantiating these findings, in Studies 4 and 5 involving a content thematic analysis of medical record and incident reports (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023) (Chapters 8 and 9), the documentation of

communication disability was commonly conflated with cognitive disability or impairment. For example, some patients who were unable to describe the circumstances of a fall due to severe communication disability were described with an umbrella term as ‘poor historians’, implying difficulties with recall. And in Study 6 involving focus group discussions, health professionals reported that they often do not consider communication disability during their falls risk and screening assessments, prevention strategies and falls reviews; instead focusing solely on cognitive impairments as in “we talk more about the cognitive impairment and don’t look too much into the communication disability.” (Sullivan et al., 2024, p11) (Chapter 10). As such, communication disability specifically often remains invisible or not reported adequately in research relating to the falls of patients with communication disability following stroke.

**Painting the Picture: The Nature of Communication Disability and Falls**

Aphasia was the most common type of communication disability reported in both the systematic review (Study 1) and the original research (Studies 4-6) (Sullivan et al., 2020; Sullivan, Harding, Skinner, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023; Sullivan et al., 2024) (Chapters 2, 8, 9, and 10). Furthermore, most participants in the original research had severe (56% and 65% in Study 4 and 5 respectively) or profound communication disability (6.4% and 4.1% in Studies 4 and 5 respectively) (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023) (Chapters 8 and 9). In addition, most patients in these studies had other stroke-related conditions or impairments including incontinence, difficulties with ambulation, and needing assistance for activities of daily living (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023) (Chapters 8 and 9).

Falls in hospital patients with communication disability.

Hospital falls in patients with communication disability after stroke were most commonly unwitnessed falls and rolling from bed (44% in Study 4), occurring across all times of the day and night, where patients were often found on the floor by nursing staff (Sullivan, Harding, et al., 2023) (Chapter 8). Study 5 reported that these falls often occurred when a patient was attempting to address a need (e.g., toileting), taking a risk (e.g., transferring from a bed to a chair independently) or having difficulties following instructions (Sullivan, Hemsley, Harding, et al., 2023) (Chapter 9). Further, Study 4 also revealed that almost half of the participants in the studies fell more than once during their hospital admission (Sullivan, Harding, et al., 2023) (Chapter 8).

**A Complex Problem: The Multiple Impacts of Communication Disability on Falls Management**

Communication disability was identified as impacting on all aspects of falls management for patients with communication disability following stroke who experience falls in hospital, as described in Figure 1. While the systematic review and meta-analysis of Sullivan et al., (2020) (Study 1, Chapter 2) found no statistical difference between communication disability and an increased risk of falls, many of the included studies either did not report on or excluded participants with severe communication disability. Studies within the systematic review that specified the inclusion of patients with severe communication disability were more likely to report a relationship between communication disability and falls, suggesting that this relationship may not be a problem for patients with mild communication disability. Subsequently, the findings of medical record and incident report data (Studies 4 and 5) and focus groups (Study 6) supported the relationship between *severe* communication disability and falls by identifying specific aspects of communication disability influencing the management of falls (Sullivan, Harding, et al., 2023; Sullivan, Hemsley,

Harding, et al., 2023; Sullivan et al., 2024) (Chapters 8, 9, and 10). These aspects are often associated with severe communication disability; with the patient having difficulty in (a) gaining attention of staff (e.g., using the call bell), (b) communicating basic needs (e.g., the need for the toilet), and (c) following simple instructions (e.g., on the need to use the call bell and/or request assistance). These aspects of communication disability were identified in the medical record and incident report studies (Study 5) and in focus groups (Study 6) as contributing factors to a patient having a fall (Sullivan, Hemsley, Harding, et al., 2023; Sullivan et al., 2024) (Chapters 9 and 10). That is, hospital staff reporting on the incidents and discussing falls in this group commonly outline these specific aspects of severe communication disability as being associated with falls. Such communication difficulties were also related to the circumstances of falls, in that patients were reportedly falling whilst attempting to address an unmet need as in "Rolled off bed after being faecally incontinent" (P71MR) (Sullivan, Hemsley, Harding, et al., 2023, p11) (Chapter 9) and taking undue risks. This was described in Study 5 "without any discussion, patient lifted himself from armchair and attempted to walk to wheelchair (P13IR)" (Sullivan, Hemsley, Harding, et al., 2023, p10) (Chapter 9). Patients reportedly also fell after being given instructions designed to prevent a fall but having difficulty following these instructions (Sullivan, Hemsley, Harding, et al., 2023) (Chapter 9).

In Studies 4 and 5, presenting analyses of medical records and incident reports, Sullivan and colleagues (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023) (Chapter 8 and 9) also revealed that health professionals had difficulty identifying and documenting the contributing factors and circumstances of some falls; particularly where the fall was unwitnessed; and the patient was unable to describe it due to severe communication disability. Although severe injuries were not commonly

identified across the studies, patients who had difficulties communicating their basic needs and following instructions were also difficult to assess for injury following a fall (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023) (Chapters 8 and 9). In Study 6, focus groups of health professionals confirmed these findings, as health professionals explained that they relied on making an 'educated guess' at times: "If it's an unwitnessed fall, we're speculating" (FG1P2) (Sullivan et al., 2024, p. 10) (Chapter 10). They also reported that the difficulties with assessment of the patient following a fall may lead to delays in treatment in that "the treatment process is also affected" (Sullivan et al., 2024, p10) (Chapter 10).

Appearing in Studies 4 and 5 analysing medical record and incident reports, the most common falls prevention strategy reportedly implemented for participants (all of whom had communication disability following stroke) was the use of equipment (e.g., floor line bed) (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023) (Chapters 8 and 9). However, difficulties with implementing effective falls prevention strategies were also noted in the records and reflected in the number of participants across the studies who had experienced multiple falls, with 47% in Study 4, (Sullivan, Harding, et al., 2023) (Chapter 8) and 45.8% in Study 5 (Sullivan, Hemsley, Harding, et al., 2023) (Chapter 9). Challenges implementing prevention strategies included the limitations of standard falls prevention strategies (e.g., equipment, additional rounding) and a lack of tailored falls prevention strategies available to meet the needs of patients with communication disability after stroke (e.g., adapted education, personalised environments) (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023) (Chapters 8 and 9). In focus group discussions (Study 6), health professionals confirmed these challenges, particularly for patients with severe communication disability (i.e., who have difficulties gaining the attention of staff and communicating basic needs)

(Sullivan et al., 2024). Health professionals viewed that falls prevention education is not typically modified for patients with communication disability to be able to comprehend the information, further complicating how they deliver effective falls prevention strategies.

**The Way Forward: Potential Falls Prevention Strategies to Improve Care for Hospital Patients with Communication Disability Following Stroke.**

This theme draws upon the three prior themes, in informing effective falls prevention strategies. The body of studies included in this metasynthesis reveal a knowledge-to-practice gap; in that although health professionals understand that communication disability likely has an impact on falls management, yet there is little evidence that this knowledge being translated into falls policy, risk assessment, or falls screening tools. As previously noted, communication disability is often either not considered or conflated inappropriately with cognitive impairments in clinical judgements that inform documentation of falls in medical records or incident reports. The lack of falls prevention strategies that specifically target the needs of patients with communication disability after stroke may be addressed at least in part by the full appreciation of this theme, the three prior themes and the implementation of falls prevention strategies suggested across the studies (see Figure 2). Box 1 provides guidance for clinicians to support the translation of this research into clinical practice.

**Box 1: Suggested Falls Prevention and Management Strategies for Hospital Patients with Communication Disability Following Stroke**

Hospital staff should use this to help guide their assessment and management of falls in patients with communication disability following stroke.

**Before a Fall: Identifying Communication Disability as Potentially Increasing Risk of Falls**

**Does the patient have:**

- A severe communication disability (e.g., significant impairment of both receptive and expressive language or speech)?
- Impaired receptive language / Difficulties following instructions?
- Impaired expressive language / Difficulties communicating their basic needs?
- Difficulties gaining attention (e.g., using the call bell or calling out).

**If so, staff should:**

- Refer to a speech-language pathologist for input regarding communication function (i.e., gaining attention, communicating basic needs, following instructions)
- Document the specific factors relating to communication disability in the medical record, nursing care plan, and on the falls risk assessment or screening tool
- Engage all members of the multidisciplinary team to develop a falls prevention plan that includes consideration of communication disability
- Use a range of supportive communication strategies to assist communication

**Before a Fall: Falls Prevention Strategies**

Consider that multiple falls prevention strategies may be required and be suited to the patient's communication disability. Staff could:

- Identify a way to communicate with the patient, particularly in relation to daily care needs
- Document the patient's functional communication skills and methods, to facilitate information transfer across staff
- Develop strong relationships with the patient with communication disability to understand and anticipate their needs where possible (e.g., to provide timely assistance, before the patient takes a risk or attempts to meet the need independently)
- Work as a team to develop a set of simple, routine instructions to use in tasks that are frequently occurring but high risk for falls (e.g., transfers)
- Adapt falls prevention education to suit the needs of patients with communication disability (e.g., use of accessible materials, pictures, gestures, communication aids, supportive communication)
- Implement alternative ways for the patient to gain attention (e.g., using a bell chime)
- Target specific impairments of communication that contribute to falls in rehabilitation and therapeutic goals and activities
- Encourage the patient's family and friends to provide support, supervision, and reminders of strategies (e.g., to ask for assistance)

**After a fall**

After a patient with communication disability has a fall, staff should:

- Use a range of augmentative and alternative communication (AAC) strategies (e.g., communication board, pictures, visual scene photos) to determine more about what happened, in the circumstances of the fall
- Use a range of communication strategies to determine if the patient has an injury (e.g., establish a yes/no response, use AAC strategies)
- Document the specific contributing factors relating to communication disability in the medical record and any incident reports of falls
- Consult with a speech-language pathologist in relation to the patient's communication disability, and collaborate as a multidisciplinary team to identify further falls prevention strategies

Falls in hospital patients with communication disability.

### *Identification of Communication Disability as a Contributing Factor for Falls*

According to the Australian Commission on Safety and Quality in Health Care (Australian Commission on Safety and Quality in Healthcare, 2009), any individual factors that may contribute to a fall in hospital should be identified in all patients systematically and comprehensively, in order to develop an individualised care plan to address these factors. Identifying the specific communication disability factors that contribute to falls may help health professionals provide a more targeted, patient specific falls prevention plan. Given falls in hospital are multifactorial (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, 2023) (Chapters 8 and 9), there is no single tool specifically designed to identify the risk and contributing factors for falls in patients with stroke (Strini et al., 2021). Additionally, clinical judgement and analysis by health professionals of falls risk and contributing factors has been shown to be as good as using a screening or assessment tool (Department of Health & Human Services, 2020; Haines et al., 2007; Strini et al., 2021).

Indeed, since the specific aspects of communication disability are not present on risk assessment and screening tools, staff will most likely need to use their clinical judgement to identify these contributing factors to falls. In their focus groups, health professionals suggested that speech-language pathologists, who have expertise in the assessment of patients with communication disability after stroke, have a significant role to play in the assessment and prevention of falls in this population (Sullivan et al., 2024) (Chapter 10). Speech-language pathologists could therefore be involved in screening for, assessing, and describing the particular aspects of communication disability that may contribute to falls in patients at risk of communication disability; within a multidisciplinary, collaborative assessment. If such assessment occurs, it should be documented clearly and be inclusive of the functional impact of the

communication disability in the hospital setting (i.e., how it impacts the patient's functional communication) and communicated with the multidisciplinary team to identify the most effective interventions to prevent a fall (Australian Commission on Safety and Quality in Healthcare, 2009; Strini et al., 2021). This approach might also foreseeably assist other health professionals to identify the role of communication disability in falls, potentially also improving the clinical judgement of falls risks for health professionals working with patients with communication disability following stroke.

### *Falls Prevention Strategies for Patients with Communication Disability*

Effective falls prevention programs are implemented because of comprehensive assessment of falls risk and contributing factors, with interventions designed to specifically address these factors (Australian Commission on Safety and Quality in Healthcare, 2009). In their focus group discussions (Study 6), health professionals suggested that there are challenges in implementing the multiple falls prevention strategies needed for patients with communication disability following stroke (Sullivan et al., 2024) (Chapter 10). The health professionals also suggested that these strategies should be implemented by the multidisciplinary team considering the patient's communication disability and any co-occurring cognitive impairments and needed to include strengthening patient-provider relationships (Sullivan et al., 2024) (Chapter 10).

**The role of family members.** The role of family members in falls prevention appeared in Studies 2, 3, 4 and 6 as a fall prevention strategy (Sullivan et al., 2021; Sullivan, Hemsley, Skinner 2023, Sullivan, Harding, Skinner 2023, Sullivan et al., 2024) (Chapters 3, 4, 8 and 10). For example, in falls prevention policies across Australia (Study 3), where patients were unable to understand or participate in falls prevention strategies and education a family member was to take an active role in

preventing a patient fall (Sullivan, Hemsley, Skinner, et al., 2023) (Chapter 4). In focus groups (Study 6), health professionals suggested that family members may be able to provide insights to further understand the patient's personality and comment on which falls prevention strategies might be effective; as well as provide support to implement falls prevention strategies including supervision, orientation, reorientation, and prompts to follow safety instructions (Sullivan et al., 2024) (Chapter 10).

**Falls prevention and stroke education programs.** Patients with stroke should have education about their function following stroke (Crocker et al., 2021). However, the functional implications of a patient's communication disability may mean that they have difficulties understanding the changes to their physical function and stroke education programs (Aleligay et al., 2008; Eames et al., 2003). Falls prevention education is known to be effective in reducing falls rates in patients in hospital (Hill et al., 2015) and provision of stroke-related and falls prevention education in a format that is tailored towards an individual and adapted to their communication disability may help to remove these barriers (Rose et al., 2003, 2010). The expertise of speech-language pathologists in supporting adaptations to communication (e.g., augmentative and alternative communication methods, supportive communication partner behaviours) may be beneficial to the successful implementation of falls prevention and stroke related education in patients with communication disability following stroke (Blackstone & Pressman, 2016; T. Rose et al., 2003; Sullivan et al., 2020; Sullivan, Hemsley, Harding et al., 2023) (Chapters 2 and 9). The provision of accessible education enables the patient to be included in the development of their falls prevention plan and is an approach that patients value and that empowers them to be an active participant in undertaking the recommended prevention strategies during their hospital admission (Carroll et al., 2010; Haines & McPhail, 2011; Radecki et al., 2018).

Falls in hospital patients with communication disability.

**Documentation, relationships, and adapted communication.** The documentation of information about the patient's communication disability, function, and any need for adapted or supportive communication strategies should provide all members of the healthcare team with information on how to optimise communication with patients during high-risk tasks (Simmons-Mackie et al., 2016). For example, the documentation of and use by health professionals of (a) consistent short sentences, and (b) single step instructions with gestures may support the patient's comprehension of safety requirements during functional tasks. Health professionals also reported that developing a strong relationship with the patient may help anticipate the patient's need for assistance by knowing what they typically need at certain times of the day (Sullivan et al., 2024) (Chapter 10). Finally, the difficulties staff reported in identifying the circumstances and outcomes of falls in patients with severe communication disability limits the ability of health professionals to implement falls prevention strategies that match the contributing factors and risks (Batchelor et al., 2010). Speech-language pathologists could support the patient to describe the fall using adapted communication strategies (e.g., communication board, visual scenes, supported conversations) allowing staff to further develop and individualised and targeted falls prevention plans.

### *Ongoing challenges for health professionals*

Across the studies, it was apparent that the increasing severity of a patient's communication disability impacted greatly on staff being able to implement falls prevention strategies. In some patients, the functional implications of their communication disability may be too significant for these strategies to be effective; particularly impacting patients with profound communication disability and patients with significant cognitive impairment (Sullivan, Hemsley, Harding, et al, 2023) (Chapter 9). For these patients, falls prevention strategies may need to be focused

elsewhere (Sullivan & Harding, 2019; Sullivan, Hemsley, Harding, et al., 2023) (Chapter 9).

There are challenges for health professionals in implementing the suggested strategies. The use of family members as a strategy to support falls prevention may be difficult as family are not always available to provide the support required. Furthermore, the responsibilities of family members when a loved one is in hospital can be stressful and exhausting, and family members may become overwhelmed with the vigilance associated with being in a protective role (Hemsley & Balandin, 2014). The development of a falls prevention plan that considers the overall role and support responsibilities of the family member, provides education to multiple family members, and is based on a schedule (i.e., having a timetable of when family members were able to provide support) may also provide some solution to these challenges. The provision of stroke and falls prevention education in an adapted format for patients with communication disability may be challenging for health professionals with known difficulties in delivering both falls prevention education and information in an adapted format for patients with communication disability (Briffa et al., 2022; Heng et al., 2022; Shrubsole et al., 2019; Young et al., 2018). Barriers to delivering information in adapted formats include competing demands on health professionals' priorities, staff resources, information resources, and time to adapt the information (Briffa et al., 2022; Heng et al., 2022; Shrubsole et al., 2019; Young et al., 2018). However, education customised to individual patient needs reduces falls in patients in hospital (Hill et al., 2015) and the provision of information about stroke contributes to stroke recovery (Hubbard et al., 2012). Delivering adapted falls prevention and stroke education materials in accessible formats should both (a) empower patients with communication disability to take an active role in their falls prevention through greater understanding of their physical

function following stroke and knowledge on how to meet their needs whilst in hospital and (b) help to meet the Australian clinical guidelines for stroke management (Stroke Foundation, 2023). It is not yet known how the advent of generative artificial intelligence (e.g., using text and images) could contribute to reducing the time demands associated with producing adapted, accessible materials for stroke and falls prevention education but this is likely to become more relevant as such technologies become more available to improve productivity (Zhang & Kamel Boulos, 2023). Based on the research to date, and synthesised in this paper, hospital managers and policy makers should explore and prioritise strategies to overcome the barriers to delivering this education. Finally, collaborative goal setting in the multidisciplinary team may be beneficial to provide rehabilitation goals relating to falls prevention and should include falls prevention education. Hospital staff suggest that such goals could focus on developing strategies to support patients to follow instructions or gain attention of staff (Sullivan et al., 2024).

**Limitations and Directions for Future Research**

This metasynthesis was, by design, limited to a body of studies sharing the main aim and line of inquiry (i.e., enabling each study to inform the next). Additionally, the included studies applied the same frame of reference or analytic lens, the Generic Reference Model of patient safety (W. B. Runciman et al., 2006). It is acknowledged that as a systematic review, qualitative synthesis, and policy review are included in this study, the synthesis also draws in some related and relevant prior research. Nonetheless, had the individual studies included in those reviews been reconsidered individually, even while providing little detail relating to communication disability, this synthesis might have been strengthened or yielded additional insights into the problem of preventing falls of patients with communication disability after stroke.

Falls in hospital patients with communication disability.

There is much to attend to in future research examining the falls of hospital patients with communication disability following left hemisphere stroke, and stroke more broadly, particularly considering the ongoing lack of research including patients with communication disability following stroke who have fallen in hospital. While the component studies in this metasynthesis examined the circumstances of falls as documented in incident reports and medical records, such research by design did not include interviews with patients with communication disability after stroke who had fallen in hospital; and did not include observational studies (i.e., observing patients on the ward to identify the circumstances of falls). Unfortunately, it was not possible for the studies conducted in this period to include the views of patients with communication disability, or observations of these patients, due to COVID-19 pandemic restrictions on research in hospital preventing that research being conducted. Thus, it remains vital that patients with communication disability following stroke are interviewed about their falls in hospital; particularly unwitnessed falls which make up a substantial proportion of the falls documented in medical records and incident reports (Sullivan, Harding, et al., 2023) (Chapter 8). Research including patients with communication difficulty following stroke could further provide clinicians and hospital management with evidence to assist in appropriately managing falls in this population.

While this metasynthesis reflected the views of healthcare professionals that the involvement of speech-language pathologists in falls risk assessment and management might help to prevent further falls, further research is needed to examine the effectiveness of these strategies, particularly for patients with severe communication disability and those who also have cognitive impairments. Given the number of patients who experience multiple falls during their admission, urgent research into effective falls prevention strategies is required. This research should include diverse methodologies,

including large-scale quantitative studies that adequately measure communication disability across large groups of patients who fall, and rigorous qualitative research drawing upon interviews with patients and observations on the ward. Research exploring the communicative interactions between patients with severe communication disability and their healthcare providers on the ward (e.g., in relation to gaining attention and requesting assistance) could also provide further critical information on the role of communication disability in falls, and further enhance our understanding to more informed falls prevention strategies (Millman et al., 2011; Shojania & Van De Mheen, 2020). Given that generative artificial intelligence might be used in creating text-based and visual materials rapidly, future research should also consider the role of these technologies in creating customized and tailored falls prevention education materials that are suited to the communication needs of patients with communication disability following left hemisphere stroke.

## Conclusion

As a form of knowledge translation, this metasynthesis analysed and re-presented evidence relating to falls of hospital patients with communication disability following stroke. Prior to the original research included in this metasynthesis, patients with communication disability after stroke have often been excluded from falls research. Despite health professionals recognising the impact of communication disability on falls management, the needs of these patients in relation to falls prevention strategies have been overlooked in both hospital falls prevention policies and in clinical management. Understanding the specific aspects of communication disability that impact falls and the common circumstances of falls could foreseeably help clinicians identify the unique needs of patient with communication disability in relation to falls prevention. Interventions suggested to reduce falls include: (a) involving family

members in supporting implementation of a range of strategies, (b) implementing tailored patient-specific falls prevention education that addresses both stroke-related and falls prevention needs, (c) drawing in speech-language pathologists, who have specific skills in relation to communication disability, in identifying communication-related factors in patients at the stage of screening for falls risk factors, and (d) using individualised and adapted, supportive communication strategies during interactions with patients and falls prevention education. Further research that includes patients with communication disability and explores effective falls prevention strategies for these patients is required. Moving this knowledge into clinical practice should help healthcare professionals provide more targeted, patient-specific falls prevention plans and for hospital managers to take meaningful steps towards improving falls prevention and management policies to include patients with communication disability following stroke.

Falls in hospital patients with communication disability.

# Chapter 12: Discussion and Conclusions

This doctoral research, in taking a social constructivist approach using mixed methods, provides original research to gain a deeper understanding of hospital falls in patients with communication disability following stroke. The seven papers embedded within this thesis were designed to address the five research questions which are discussed this chapter. The discussion is presented with in order reflecting the patient journey and Generic Reference Model (Runciman et al., 2006), that is the discussion is presented firstly considering the risk and contributing factors to falls, then the circumstances of a fall, the outcomes, and consequences of a fall. Potential falls prevention strategies are organised under the headings that relate to the contributing factors outlined in the Generic Reference Model. This chapter also discusses the implications for hospital falls policies and the contribution this body of work has made to patient safety research for patients with a communication disability following stroke. The limitations of this body of work are discussed, along with setting the research agenda for the future and the thesis finishes with concluding statements.

## Communication Disability as a Risk Factor for a Fall in Patients with Communication Disability Following Left Hemisphere Stroke

The findings from the studies presented in Chapters 2 – 4 and 8 – 11 collectively outline the complex nature of hospital falls in patients with communication disability following stroke. In Chapter 2, the systematic review did not find a statistical association between falls and a non-specific diagnosis of communication disability following stroke; however, three studies within the review suggested patients with severe strokes and significant communication impairments may be at a higher risk of falls (Sullivan et al., 2020). The results of Chapters 8 and 9, the medical record and incident report studies, Chapter 10, focus groups of health professionals, and Chapter

11, the meta synthesis; all support the notion that the presence of communication disability in patients with stroke adds complexity to all aspects of falls management (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023, Sullivan et al., 2024).

It is possible that the contrasting finding between the systematic review of no significantly increased risk (Sullivan et al., 2020) and the other studies within this thesis that provided a qualitative consideration of patients being more at risk of falls (Sullivan et al., 2021; Sullivan, Hemsley, Harding, & Skinner, 2023; Sullivan, et al., 2024) could reflect the under-representation of patients with communication disability in falls research. In particular, this may be reflective of the under-representation of patients with severe communication impairments, and poor reporting of communication disability severity and type when patients are included in the research (Hemsley et al., 2019; Sullivan et al., 2020). The findings of falls research that includes patients with severe stroke suggests that patients with more significant functional impairments following a stroke are at a greater risk of falling (Gangar et al., 2022; Rabadi et al., 2008; Schmid, Kapoor, et al., 2010; Sze et al., 2001). Indeed, patients with more severe strokes are more likely to have a communication disability (C. Mitchell et al., 2020) and the results from this body of work suggest that communication disability is an important factor to consider in the falls of patients with communication disability following stroke.

**Communication Disability as a Contributing Factor to Falls in Patients with Communication Disability Following Left Hemisphere Stroke**

Successful communication between patients and healthcare professionals is recognised as integral to the provision of safe and effective health care (Balandin et al., 2001; Hemsley et al., 2013, 2016a; Hurtig et al., 2019) and there is no doubt that

communication disability can disrupt this communication leading to adverse hospital events (Bartlett et al., 2008; Carragher et al., 2021; Hurtig et al., 2019). Falls research that includes patients with communication disability following stroke suggests that communication disability is a contributing factor for a fall in hospital (García-Rudolph et al., 2021; Salamon et al., 2012; Sinanovic et al., 2007; Sullivan & Harding, 2019; Sze et al., 2001). However, this body of research has primarily measured general impairments of communication disability by relying only on FIM scores (Salamon et al., 2012), general diagnosis of receptive or expressive aphasia (Sze et al., 2001), or descriptions of impaired 'comprehension and verbal fluency' (García-Rudolph et al., 2021). This doctoral research is the first to include diagnostic information about communication disability in an attempt to identify the specific functional aspects of communication disability potentially contributing to a fall for hospital patients with communication disability following stroke.

**The Context and Nature of Falls for Patients with Communication Disability Following Left Hemisphere Stroke**

In Chapters 8 and 9, the specific context and nature of falls for patients with communication disability following stroke were identified and then further discussed in the health professional focus groups in Chapter 10 (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding et al., 2023; Sullivan et al., 2024). The majority of falls in these studies were attributed by health professionals to patient intrinsic factors (e.g., balance impairments), rather than environmental factors (e.g., wet flooring) or organisational factors (e.g., suboptimal staffing levels). Falls in patients with communication disability were most commonly unwitnessed rolls or falls from bed whilst patients were attempting to address an unmet need, particularly in relation to toileting. This finding highlights the complex relationship between a patient's

communication disability, their needs, and the risk of falls. Other falls occurred when patients who were in the process of transferring (e.g., from a bed to a chair) were taking more risks (e.g., reaching too far forward in their wheelchair) or having difficulties following instructions. Falls prevention strategies should be an integral part of a patients stroke rehabilitation plan, and by understanding the context and nature of falls in patients with communication disability following stroke, health professionals should be able to proactively develop more effective falls prevention programs (Lee & Stokic, 2008; Mackintosh et al., 2005; Morone et al., 2020).

Other qualitative studies investigating falls in hospital patients from the perspective of the patient have also noted falls commonly occur when patients are feeling a sense of urgency regarding toileting (Aihara et al., 2021; Carroll et al., 2010). Approximately 50% of patients following stroke have incontinence, and it is often associated with more severe strokes (Thomas et al., 2019). It can be difficult to determine if incontinence is a direct result of the stroke (i.e., related to the site of the lesion) or is a functional outcome of having difficulty with any aspects of the everyday self-care activity of getting to the toilet; such as problems with balance, vision or cognitive impairments that are reducing access to safe toileting (Thomas et al., 2019; Lee & Pyun, 2014; Yao et al., 2020). Patients with communication disability after stroke have added complications for managing incontinence in hospital when they have difficulties gaining the attention of staff and communicating their basic needs. In addition, there is little evidence to guide health professionals to provide intervention to reduce episodes of incontinence for patients (Thomas et al., 2019). Nevertheless, communication disability in patients who are incontinent can be a barrier to providing timely care, further compounding the depression and negative social consequences associated with both communication disability and incontinence (Lincoln et al., 2012;

Thomas et al., 2019) and leading patients to risk falling during their attempts to meet this need and retain their dignity.

The finding that patients with communication disability after stroke experienced falls as they were taking a risk adds depth to recent literature about reasons why patients fall in hospital (Aihara et al., 2021; Haines et al., 2015; Hanger et al., 2014; Mangset et al., 2008). In a study including interviews with older adults, their informal carers and health professionals that aimed to understand why older adults take risks that may lead to falls in hospital, health professionals viewed such falls as occurring when patients were frustrated with progress or testing their skills (Haines et al., 2015). Studies investigating patient experiences of falls suggest that patients may be more inclined to take additional risks when: (a) testing their abilities (Aihara et al., 2021; Haines et al., 2015; Hanger et al., 2014), (b) waiting a long time for help (Haines et al., 2015; Mangset et al., 2008), or (c) experiencing a breakdown in communication (Haines et al., 2015). Without including patients with communication disability in interviews or focus groups in this body of work, it is not possible to identify what patients with communication disability are thinking or wanting to happen in the moments leading up to their falls. Patient participation is an important component of patient safety research (Hemsley & Balandin, 2014). By including patients with communication disability following stroke in the review of their fall, understanding the thoughts and behaviours leading up to the fall may help health professionals understand the contributing factors further, thus enhancing patient specific falls prevention plans (Aihara et al., 2021).

**The Outcomes and Impacts of Hospital Falls for Patients with Communication Disability Following Left Hemisphere Stroke**

In Chapter 8, the outcomes and impacts of hospital falls for patients with communication disability following stroke are reported (Sullivan, Harding, et al., 2023).

Injuries from falls occurred in 15.2% of patients, and of those 13 were serious injuries (4.2%). In contrast, the injury rate in the literature ranges from 15.6% (Czernuszenko & Czlonkowska, 2009) to 88% (Bugdayci et al., 2011). The injury rate in this study being on the lower end of that range is possibly due to the differing circumstances of falls in patients in this study being falls from bed, compared to other stroke patients who fall more during transfers and walking (Sullivan, Harding, et al., 2023). This may be reflective of the inclusion of patients with severe strokes in Chapter 8, who are less likely to be mobile (Sullivan, Harding, et al., 2023). In a study of inpatient falls across hospital wards, Hignett et al., (2013) found that falls within the bed space were less likely to result in harm to the patient. Additionally, given most falls were from a bed lowered to floor line, the likely injury of a fall from this height is reduced; and further reduced when a crash mat was placed next to the bed (Bowers et al., 2008).

This study's medical record and incident report research (Chapters 8 & 9) demonstrated that hospital staff provide scant detail on the outcomes of falls of patients with communication disability following stroke (Sullivan, Harding et al., 2023; Sullivan, Hemsley, Harding, et al., 2023). However, some changes to the patient's rehabilitation journey were documented, and this finding was supported in focus group discussions reported in Chapter 10 (Sullivan et al., 2024). The lack of detailed reporting in the medical record and incident reports, however, leaves questions remaining about how these changes to the patient's rehabilitation journey impacted the patient (e.g., changes to discharge setting or goals) and the organisation (e.g., longer length of stay). Without the patient perspective, and little detail on outcomes of falls being documented, it is challenging to fully understand the impact of falls on patients with communication disability following stroke. Aside from the difficulties assessing for injuries and pain after a fall (described in Chapter 10) (Sullivan, et al., 2024) patients who experience

falls often go on to experience a fear of falling (Schmid et al., 2009; Weerdesteyn et al., 2008), the consequences of which can include decreased physical activity, loss of confidence, decreased social interactions and loss of independence (Schmid et al., 2009; Weerdesteyn et al., 2008). Additionally, patients with communication disability are known to have dissatisfaction with the quality of care in hospitals (Bartlett et al., 2008; Hoffman et al., 2005; Tomkins et al., 2013) and it is possible that experiencing a fall may be contributing to poor health care satisfaction and a fear of falling, leading to poorer health outcomes for patients with communication disability following stroke.

In Chapter 10, health professionals in the focus groups discussed ways in which communication disability can influence the assessment of the patient following a fall; with potential delays to treatment of injuries if communication breakdown occurs during the assessment (Sullivan et al., 2024). Studies investigating the experiences of health professionals when communicating with patients with aphasia have similar findings in relation to the functional implications of communication disability leading to delays in treatment (Carragher et al., 2021; O'Halloran, Worrall, et al., 2012; van Rijssen et al., 2022). Supporting communication with patients with communication disability to communicate the effects of a fall (e.g., pain or injury) should work to enable more effective clinical assessments and more timely investigations and treatment of any injuries following a fall. Lack of time is a barrier to communication between hospital staff and patients with aphasia following stroke (Hemsley et al., 2012), and on a busy ward this may mean that post-fall investigations are more difficult without additional supports being provided (e.g., communication assistance, aids, or strategies). Supporting the communication needs of patients with aphasia falls well within the scope of practice of speech-language pathologists (Blackstone et al., 2011). For example, establishing an effective means of the patient gaining attention, and communicating

basic needs would be important goals for the multidisciplinary team that could have vital input from SLPs who have training and experience in the design and implementation of AAC (e.g., communication boards, speech devices).

**Potential Strategies That Might be Able to Reduce the Risk of Falls in Patients with Communication Disability Following Stroke**

In Chapters 8 and 9, the existing falls prevention strategies to reduce falls risk amongst hospital patients with communication disability following stroke were examined in the analysis of data extracted from medical record and incident reports (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023). These were further verified and expanded upon during focus groups, and reported in Chapter 10 (Sullivan, et al., 2024). Potential strategies that might work to reduce the risk of falls in patients with communication disability following stroke were suggested by the health professionals in the focus groups (in Chapter 10) (Sullivan, et al., 2024) and clinical implications for health professionals reported and discussed in the meta-synthesis of findings (Chapter 11). Falls prevention in patients with communication disability following stroke in inpatient rehabilitation is a multidisciplinary goal that requires health professionals to work collaboratively (Eikenberry et al., 2019).

Difficulties implementing falls prevention for patients with communication disability were presented in Chapter 8 and 9; with nearly half of the participants in those studies experiencing multiple falls; and the documentation by health professionals indicating that staff had implemented various strategies in attempting to prevent a fall (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding et al., 2023). The barriers to effective falls prevention strategies in patients with communication disability are discussed throughout Chapters 2 – 4 and 8 – 11 and are multifactorial (Sullivan et al., 2020; Sullivan et al., 2021; Sullivan, Hemsley, Skinner, et al., 2023; Sullivan, Harding,

et al., 2023; Sullivan, Hemsley, Harding, et al., 2023, Sullivan, et al., 2024). Identifying the most pertinent risk and contributing factors for falls in hospital (including those specific to communication disability) - specific to individual patients, understanding the nature of falls in patients with communication disability, and identifying the functional implications of communication disability in a hospital setting will help health professionals, hospital managers and policy makers implement more effective falls prevention strategies (Australian Commission on Safety and Quality in Health Care., 2019; Batchelor et al., 2010; De Jong et al., 2018; Kilbridge & Classen, 2006). Furthermore, addressing the practice gap of speech pathologists in falls management will enhance these falls prevention plans and the skills of the multidisciplinary team.

***Environmental Factors***

In this doctoral research, documented falls where (a) the circumstances and contributing factors were unable to be determined due to the severity of the patient's communication disability, and (b) the fall was unwitnessed, pose a challenge for health professionals identifying or using appropriate falls prevention strategies to mitigate the risk of another fall. Video surveillance allows for constant monitoring of patients and if the patient engages in a behaviour that would place them at risk of a fall (e.g., attempting to get out of bed alone), there is the potential for staff to intervene to prevent the fall. The use of video surveillance may be effective as part of a fall prevention plan but has little literature to support its use (Cournan et al., 2018; Sand-Jecklin et al., 2016). Small scale studies within hospital wards have shown positive effects in reducing the rate of falls by using video surveillance as an additional tool in a falls prevention plan (Cournan et al., 2018; Hardin et al., 2013; Sand-Jecklin et al., 2016). However, this technology is not without its challenges; not least of which concerns patient and health professional privacy and confidentiality in a healthcare setting

(Cournan et al., 2018; Hardin et al., 2013). There would also be a need for training and employing skilled professionals to monitor the system (Cournan et al., 2018). Regardless of these challenges, video surveillance may provide valuable information to health professionals about a patient's activities prior to a fall, allowing them to identify contributing factors to falls, implement specific prevention strategies, and target rehabilitation goals towards those contributing factors.

***Organisation Factors***

To effectively target falls prevention strategies to the individual patient, health professionals need to (a) identify the risks and contributing factors to falls, and (b) continuously assess the patient throughout their rehabilitation journey; as these factors may change due to functional improvements, for example as a patient's mobility improves, they may test their skills (Aihara et al., 2021). The Inpatient Functional Communication Interview is a reliable and valid communication assessment tool, conducted at the bedside to assess the patient's ability to communicate in a variety of hospital settings (O'Halloran et al., 2020). The tool provides clinicians with information on how support communication with the patient during their hospital admission and contains a staff questionnaire designed for use by clinicians other than speech pathologists and was developed for health professionals to identify and support patients who have difficulties communicating, including those with communication disability (O'Halloran et al., 2020). The staff questionnaire includes identifying if the patient can: (a) follow instructions (question 5), (b) ask for something (question 12), and (c) call a nurse if they need to (questions 14) and takes approximately two minutes to complete. Introducing the use of the Inpatient Functional Communication Interview Staff Questionnaire with patients with communication disability following stroke, would potentially identify the specific aspects of communication disability found to be a

contributing factor for falls in hospital for patients with communication disability after stroke (a) difficulties following instructions, (b) difficulties communicating basic needs, and (c) difficulties gaining the attention of staff. This knowledge would then provide health professionals with the information to consider strategies to mitigate these contributing factors for falls and enhance communication between health professionals and patients.

Hospital patients have reported wanting to be involved in developing their falls prevention plan and this is supported by the hospital falls prevention policies reviewed in Chapter 4 (Carroll et al., 2010; Sullivan, Hemsley, Skinner, et al., 2023). Involving patients in this process empowers them to implement the strategies and adhere to the recommendations (Heng et al., 2021). Such empowerment could be strengthened by providing patients with communication disability following stroke with ongoing stroke rehabilitation and falls prevention education in an adapted format suited to their communication needs. Health professionals working as a multidisciplinary team can deliver consistent messages to the patient regarding specific strategies to prevent falls and continue to promote the positive aspects of rehabilitation (Aihara et al., 2021; Carroll et al., 2010; Heng et al., 2021).

### *Human Factors*

Supportive therapeutic relationships are an essential part of stroke rehabilitation (Bright & Reeves, 2020). For patients with communication disability, these relationships are critical for engagement in rehabilitation (Bright & Reeves, 2020). In Chapter 10, health professionals in focus groups discussed the importance of developing a therapeutic relationship with patients with communication disability after stroke and how this would support the management of falls in these patients. However, health professionals in the focus groups also reported that communicating with patients with

communication disability is time consuming and frustrating at times which is well noted in the literature (Carragher et al., 2021; Hemsley et al., 2012; Hur & Kang, 2022; Hurtig et al., 2019). In the hospital environment where there are often multiple demands on staff time, communication is the most neglected activity by health professionals, leading to a potential breakdown in the relationship and requiring support from family members to support patients in hospital (Balandin et al., 2001; Bright & Reeves, 2020; Carragher et al., 2021; Hemsley et al., 2013; Hur & Kang, 2022; Sullivan, et al., 2024). However, to manage falls, supportive therapeutic relationships between patients and health professionals may work to circumvent communication disability as discussed in Chapter 10 (Sullivan, et al., 2024). The barriers to developing these relationships can arise not only from a lack of time, but also the communication practices of health professionals (e.g., talking over or excluding the patient) and clinician-centred interactions (i.e., the clinician is focused on the task and the patient is unseen) (Bright & Reeves, 2020). Support to develop these relationships needs to be driven by organisational change that values communication as the foundation to building relationships with patients and view these relationships as a fundamental part of care (Bright & Reeves, 2020).

***Patient Factors***

As outlined in Chapter 9, individualised communication strategies were described but results suggested that these were used inconsistently across patients and individual fall circumstances (Sullivan, Hemsley, Harding, et al., 2023). Supporting these findings, health professionals in the focus groups described implementing standard falls prevention strategies and, in some individual cases, strategies designed to aid patients with communication disability (e.g., hearing amplifiers and pen and paper) to help patients express themselves, highlighting that communication partners may try to accommodate the person's communication disability. While well-intentioned,

amplifying the sound of spoken language will not aid in its comprehension (Worrall & Hickson, 2003) and pen and paper could be as difficult a modality as spoken language for a person with aphasia, if all modalities are affected in similar ways (T. Rose et al., 2003). Such strategies, while potentially assisting some patients, could be seen as unsophisticated through lack of awareness of the impact of the impairment on hearing and literacy. Indeed, increasing volume in the hope it will improve understanding is considered maladaptive in terms of Communication Accommodation Theory (Worrall & Hickson, 2003). However, as identified in Chapter 4, the lack of policy outlining how to manage falls risk prevention and management in patients with communication disability might help to explain why staff might be left with rudimentary communication strategies unlikely to markedly improve a patient's ability to communicate their needs before or after a fall (Sullivan, Hemsley, Skinner, et al., 2023). Further in this chapter, the policy implications of this thesis will be discussed.

***Medication, equipment, documentation***

The difficulties understanding the contributing factors and circumstances of falls where the fall was unwitnessed and the patient is unable to describe it due to severe communication disability may be leading to the over reliance on generic falls prevention strategies (Kilbridge & Classen, 2006), particularly equipment (as noted in Chapter 8). Across Australia, hospitals are investing significant resources into falls prevention strategies (D. Mitchell et al., 2018) however, many of these have weak or little evidence supporting their effectiveness (D. Mitchell et al., 2018). The medical record and incident reports analysed in Chapter 9, showed that for some patients the mobilisation alarm substituted the patient using the call bell or verbal communication to gain the attention of staff to address a need (Sullivan, Hemsley, Harding, et al., 2023). A mobilisation alarm is designed to alert hospital staff when a patient is attempting to

mobilise. Indeed, on inpatient rehabilitation wards, approximately one in nine patients has a mobilisation alarm as a falls prevention strategy (Brusco et al., 2021), representing approximately 11% of the falls prevention budget (D. Mitchell et al., 2018). However, there is growing evidence from randomised control trials that these alarms are unlikely to prevent falls (Brusco et al., 2021; D. Mitchell et al., 2018). This may be due to: (a) overuse, (b) staff having to choose between the risks of the patient with the alarm or leaving their current task to attend to the patient with the alarm, and (c) more than half of alarms (52%) being triggered when the patient has not moved (Brusco et al., 2021; D. Mitchell et al., 2018). Whilst mobilisation alarms may provide a useful strategy for some patients, including those with communication disability, falls prevention strategies are expected to be more effective when implemented in response to identified risks and contributing factors (Australian Commission on Safety and Quality in Health Care., 2019). The use of multidisciplinary assessments to identify the risks and contributing factors for patients at risk of falls during inpatient stroke rehabilitation should allow for timely, specific falls prevention strategies to be implemented; itself relying on improved multidisciplinary awareness of the range risk and contributing factors for falls to potentially reduce falls incidence in this population (Gangar et al., 2022; Lohse et al., 2021).

### Implications for Hospital Falls Prevention and Management Policies and Procedures

To enhance the management of falls in patients with communication disability following stroke, translation of the research within this thesis into hospital falls policies is necessary to provide appropriate falls prevention strategies and management (Finch et al., 2009). Typically, falls prevention policies provide guidance for staff to: (1) screen for falls risk factors when the patient is admitted to the ward, and then routinely after

that, (2) develop a falls prevention plan, and (3) manage any falls that occur during the patient's admission. However, the lack of policy outlining how to manage falls risk prevention and management in patients with communication disability outlined in Chapter 4 is contributing to the invisibility of communication disability in the management of hospital falls (Sullivan, Hemsley, Skinner, et al., 2023). The development of hospital falls prevention polices that are inclusive of patients with communication disability would help health professionals care for these patients more effectively.

In the Best Practice Guidelines for Australian Hospitals Preventing Falls and Harm From Falls in Older People document (2019), considerations for special populations and settings (i.e., patients with cognitive impairment, rural and remote settings, and Indigenous and culturally and linguistically diverse patients) are outlined within sections of the document: (a) standard falls prevention strategies, (b) management strategies for common falls risk factors, and (c) minimising injuries from falls. For example: Section 5: Falls risk screening and assessment (Australian Commission on Safety and Quality in Health Care., 2019) contains a special consideration for cognitive impairment:

> Identifying the presence of cognitive impairment should form part of the falls risk assessment process. However, the falls prevention interventions that are chosen, based on the assessment, may need to be modified to make sure they are suitable for the individual, and often the carer or family members will also play an important role in implementing falls prevention actions, particularly in preparation for discharge and after return home. (pp37)

In this statement, health professionals are encouraged to consider cognitive impairment and the functional impacts of this impairment in their assessment of falls risk, and to

provide adaptations to the falls prevention strategies to suit the patient's needs. In another example in the balance and mobility limitations section (2019):

> Risk factors for falls (e.g., gait and balance problems) are more prevalent in older people with cognitive impairment than in people without cognitive impairment. People with cognitive impairment should therefore have their falls risk investigated as comprehensively as those without cognitive impairment. Interventions shown to work in cognitively intake populations should not be withheld from cognitively impaired populations, unless there is a problem with ability to follow or comply with instructions (see Chapter 7 on cognitive impairment). Simplifying instructions, and using picture boards and demonstrations, are strategies that may improve the quality of exercise for patients with cognitive impairment. Family members, carers and other volunteers may be able to help in supervising and motivating patients who are following exercise programs. (pp47)

In this statement, health professionals are directed to evidence that patients with cognitive impairment have greater risk factors for falls and that adaptations should be made to the exercise interventions to enable patients with cognitive impairment to participate. Additionally, strategies are suggested to adapt the exercise programs to support participation for patients with cognitive impairments. Statements such as the above for patients with communication disability within the best practice guidelines may provide hospital managers with guidance about how to include these patients in hospital falls policies and procedures. For example, a statement about risk factors for falls in patients with communication disability after stroke may include:

*Identifying the presence of communication disability should form part of the falls risk assessment process, particularly identifying if the patient is able to communicate their basic needs, follow simple instructions and use the call bell. Any falls prevention interventions that are chosen may need to be modified to suit the individual and a speech pathologist may need to be consulted to provide appropriate advice. Family members or visitors will also play an important role in implementing falls prevention actions.*

Further, an example of a statement about within the falls prevention strategies section may include:

*Patients with communication disability after stroke have unique factors that contribute to their falls including difficulties using the call bell, communicating their needs, and following instructions. Patients with communication disability should have their falls risk investigate as comprehensively as those without communication disability. Interventions that have been shown to work in patients without communication disability should not be withheld from those with communication disability, including balance and exercise. Using augmentative and alternative communication strategies may allow patients with communication disability to participate in these interventions. Suggestions include: (a) developing a set of simplified verbal instructions that are suited to the patient's communication needs, and (b) using video modelling or picture/photo boards of the exercise to support comprehension of the steps included. Family members be able to provide staff with suggestions for communication strategies for patients with long standing communication disability, or a speech pathologist may be able to provide advice as appropriate.*

The inclusion of considerations for patients with communication disability should be separated from the considerations for patients with cognitive impairments too ensure the aspects of communication disability contributing to falls are identified and any mitigating strategies are specific to the identified risks (Oliver et al., 2010). Providing statements relating to patients with communication disability following stroke, such as the above suggestions, within the Australian guidelines for falls prevention in hospitals would help provide guidance to health professionals to: (a) include patients with communication disability in in the development of their falls prevention plans, (b) provide tailored falls prevention strategies for the risks and contributing factors for falls

associated with communication disability, (c) manage the falls of patients with communication disability appropriately.

**Communication Disability and Patient Safety Research**

For patient safety research to be effective in addressing the rate of patient related adverse events in hospital, the research needs to focus on the source of the risks and hazards that lead to the event (Battles & Lilford, 2003). Patients with communication disability are three times more likely to experience an adverse event whilst in hospital (Bartlett et al., 2008), and communication disability is known to be a contributing factor to adverse events in hospital (Hemsley et al., 2016b, 2019; Hurtig et al., 2019; Steel et al., 2019). This results of the studies within this thesis adds to the patient safety research in this population. By highlighting the specific aspects of communication disability that may contribute to falls adds to the understanding that communication disability as a generic category within studies, may not provide enough detailed information to fully appreciate the risks and contributing factors to the adverse events experienced by patients with communication disability. Adding specific functional information relating to communication disability in study designs, may help further explain the increased rate of adverse events experienced by patients with communication disability in hospital, and allow health professionals and hospital managers to develop appropriate policy and prevention strategies (Sherman et al., 2009).

The medical records and incident report reviews in Chapter 8 & 9 show that patient factors were considered the most common contributing factor to a fall in patients with communication disability after stroke (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023). However, there was limited reporting of the other systems that make up the complexity of hospitals, including the environment (e.g., proximity to the toilet) and organisational factors. Using a patient safety model such as

the Generic Reference Model (W. B. Runciman et al., 2006) to examine adverse events from multiple data sources, allows classification of adverse events that takes into account the complexities of a hospital setting (W. B. Runciman et al., 2010) and determine where further research is required to reduce adverse events (Foy et al., 2011). However, in this research, the data were limited to medical records and the fields required in the incident reporting system, which did not capture all the elements of the complex health system, particularly in relation to the contributing environmental factors to a fall. Considering the Generic Reference Model and the document data, this thesis focused on the contributing patient factors (subject of incident factors) to falls with some consideration given to the contributing organisational, human and documentation factors. Multiple approaches to patient safety research are required to populate the model (Battles & Lilford, 2003) and using more nuanced data from other sources (e.g., observation and analysis of the hospital environment, medication charts, organisational policies) would allow examination of patient safety practices that include the interacting complexities of healthcare (Foy et al., 2011; W. B. Runciman et al., 2010).

A three-stage research continuum for organising patient safety initiatives has been proposed by Eisenberg (2001, as cited in Battles, 2003): 1) identify the risks and hazards that cause or have the potential to cause adverse events; 2) design, implement and evaluate practices that eliminate hazards; and 3) maintain vigilance (Battles & Lilford, 2003). The use of the Generic Reference Model (W. B. Runciman et al., 2006) in this research allowed for standardised definitions and terms to identify the risks and contributing factors to falls in patients with communication disability following stroke and allows researchers to build on this work with a foundation of cumulative understanding of the terminology (Foy et al., 2011). Future researchers in this area will be able to build on this work, facilitating the systematic collection and aggregation of

information and data, potentially offering a more appropriate method of generalising these findings rather than replicating the study (Foy et al., 2011; W. Runciman et al., 2009). Furthermore, this research would allow healthcare services to consider the resourcing requirements in both metropolitan and non-metropolitan centres (e.g., staffing, equipment, training) to implement enhanced falls assessment, prevention, and management plans for patients with communication disability following stroke.

**Limitations**

There are several limitations to this body of work, as previously outlined in relation to its adaptation in the context of COVID-19 and in the individual studies presented in Chapters 8 – 12 (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023; Sullivan, et al., 2024). This doctoral research was greatly impacted by COVID-19 due to restrictions on research activities at the health service, and lockdowns in Melbourne, Australia. Although adaptations were made to the ethics applications to alter the data sources, recruitment efforts to the focus groups were affected (outlined in Chapter 6), as was the ability to obtain patient perspectives on their falls. Both staff and patient perspective on falls are important to consider in order to devise effective falls prevention strategies (Carroll et al., 2010; Heng et al., 2022; Millman et al., 2011) as both groups are more likely to engage with the evidence base when they are involved.

As noted in Chapters 8 and 9, there are limitations to the use of medical records and incident reports as a data source, particularly in relation to hospital falls due to: (a) lapses in documentation (missing or illegible documentation) meaning the data source is incomplete, (b) knowing that verbal interactions between health professionals may not be documented, and (c) not accounting for how health professionals consider and apply documentation from other colleagues (Sullivan, Harding, et al., 2023; Sullivan,

Hemsley, Harding, et al., 2023). Indeed, incident reporting in hospitals is considerably under-reported (Christiaans-Dingelhoff et al., 2011), particularly in relation to reporting falls where there was no injury (Haines et al., 2008), falls subsequent to the first fall (A. M. Hill et al., 2010a), and near-miss events which are known to show the same underlying causes as actual adverse events (Evans et al., 2006; Lamb & Nagpal, 2009). For researchers to develop effective falls prevention programs, data relating to falls in hospital should come from multiple sources including medical records, incident reports, and staff and patient perspectives. The development of falls prevention programs for patients with communication disability following stroke would be helped by health professionals including more written information about the patient's functional communication ability in the medical record and incident report when making notes at the time of the fall. Such information would increase the visibility of communication disability in falls research by providing essential information about the type and severity of communication disability and any potential impact of communication disability in relation to the fall. This information could then be used to support research into effective falls prevention strategies and the development of hospital falls policies that include patients with communication disability.

The data sources in Chapters 8 and 9 were obtained from one metropolitan health service, which cannot be considered representative of falls assessment, prevention, and management procedures for patients with communication disability following stroke in health services more broadly (Sullivan, Harding, et al., 2023; Sullivan, Hemsley, Harding, et al., 2023). Other health services may have other or additional procedures in place that have specific references to patients with communication disability following stroke, and speech pathology services enabling greater advocacy and interprofessional approaches in falls assessment, management,

and prevention. Furthermore, the health professionals in the focus groups were recruited from and working in one state in Australia and cannot be representative of all health professionals working with patients with stroke. The inclusion of data from health services and health professionals from other states and territories within Australia and internationally might have yielded greater insights into falls in patients with communication disability following stroke. Examining the circumstances and outcomes of falls across a range of health services including those from non-metropolitan centres, may have identified a wider range of environmental factors such as the ward layout, and organisational factors such as staffing levels, roles of health professionals, and policies and procedures that include considerations for patients with communication disability. Additionally, further suggestions for effective falls prevention strategies may have been discussed in the focus groups with a broader recruitment in light of other hospital policies, procedures, or ward based local protocols.

**Setting the Research Agenda**

Given the rate of patients with communication disability following stroke who reportedly experienced multiple falls, it seems crucial that future research investigates effective falls prevention strategies for these patients. Accurate documentation and the transfer of information about a patient is complex (Steel et al., 2019; Yasan et al., 2020). Medical records provide multidisciplinary teams a way to share information about patients and a key finding of this doctoral research is that a communication disability is not properly or fully considered by health professionals in falls management. Research that establishes ways to incorporate the identified specific aspects of communication disability contributing to falls into falls risk and screening assessments - and if this informs more appropriate falls prevention strategies - would go some way to addressing this knowledge to practice gap. Falls prevention requires

significant policy response to appropriately target falls prevention strategies and there is benefit to researchers and policy makers collaborating to maximise the research translation (Clemson et al., 2010; Finch et al., 2009). Researchers and policy makers working together would ensure that evidence is provided in a way that can directly inform and be translated into policy (Finch et al., 2009).

Across the studies in this thesis, there is clear evidence of hospital staff attempting to establish communication but with little evidence of this being done in a systematic way or with the support of a speech pathologist. As previously noted, effective patient-provider communication is essential for preventing adverse events (Stans et al., 2017) and future research including patients with communication disability following stroke should investigate if AAC and other communication supports may be used to enable: (a) greater inclusion in falls research for patients, (b) patient participation in the development of falls prevention plans, (c) patient participation in falls prevention education, and (d) greater understanding of the contributing factors to and circumstances of falls that are unwitnessed. From a therapeutic perspective, AAC and multimodal communication supports (e.g., pictures, video modelling) may be beneficial when patients with communication disability following stroke are undertaking physical retraining tasks and practicing these tasks functionally on the ward. For example, the provision of a picture sequence or video snippet depicting the correct transfer technique may help some patients overcome communication breakdowns during these tasks that lead to falls; particularly for patients who experience falls when they have difficulties following instructions. Other therapeutic interventions such as alternatives to the call bell (e.g., single use door chimes) may also be beneficial in helping patients gain the attention of staff. Research should investigate if these may

reduce the rate of falls for patients who experience falls due to difficulties gaining attention of staff and attempting to address unmet needs.

The provision of aphasia-friendly health information (e.g., using supports such as visual supports, video modelling, pictures and multimodal communication) is known to be effective at improving the comprehension of information in patients with aphasia (T. Rose et al., 2003). Also, falls prevention education is known to be effective at reducing the rate of falls in patients undergoing rehabilitation (A.-M. Hill et al., 2015). Therefore, consideration of the environment to create a communicatively accessible environment may help patients with communication disability comprehend and participate in falls prevention education (O'Halloran et al., 2011; Stans et al., 2017). However, it is unclear if providing aphasia-friendly falls prevention education will have the same benefits to patients with communication disability following stroke and this should be explored in further research.

The benefits of obtaining the perspective of patients with communication disability following stroke on their falls in hospital has been noted throughout this thesis. Future research that investigates falls in patients with communication disability following stroke should continue efforts to include the patient perspective (Millman et al., 2011). Diverse methodologies that could be utilised to investigate this include: (a) direct observations of communicative interactions between patients and health professionals, (b) observation of patient activities, and (c) interviews with patients and health professionals. Such data would have potential to provide further information about falls in patients with communication disability following stroke and likely enhance falls prevention plans (Aihara et al., 2021; Millman et al., 2011).

Given this doctoral research was limited in scope to recruitment from one metropolitan health service, large scale medical record and incident report reviews

across multiple health services may be beneficial to enable further understanding of contributing factors, circumstances, and outcomes of falls in patients with communication disability following stroke. Further, this type of study design would enable comparisons of falls between patients with and without communication disability following stroke, or between varying severities of communication disability and potentially enhance understanding of relative risk of falls in these patients.

The question of how to direct falls prevention resources for patients with cognitive impairment and patients with profound communication disability is one that requires further investigation. Whilst patients with cognitive impairment were included in this research, the functional impairments relating to the cognitive impairment were not considered or discussed (e.g., memory loss) in relation to falls. Furthermore, the functional implications of a profound communication impairment may be too significant for the falls prevention strategies suggested in Chapter 11 to be effective and falls prevention in these two groups of patients continues to challenge health professionals and hospital managers. Further research should investigate how best to direct falls prevention resources in these patient populations.

## Conclusion

The results of this doctoral research provide an in-depth understanding of falls in patients with communication disability following stroke during inpatient rehabilitation revealing that communication disability impacts all aspects of falls management in hospital. However, these impacts are lacking in detail, through the low rates of inclusion of patients with communication disability in previous falls research and little mention of this group in hospital policies and procedures. Furthermore, the findings of the studies in this thesis suggest that health professionals do not routinely consider communication disability when assessing falls risk and potential contributing factors to a fall,

implementing falls prevention strategies, reviewing the fall of a patient with communication disability following stroke, or documenting it in medical records or incident reports. Overall, communication disability remains all but invisible in patient safety falls research and despite patients with communication disability being at risk of falls in hospital the reasons for this remain unclear.

Falls in patients with communication disability following stroke were most commonly unwitnessed rolls from bed, occurring across all times of the day and night and patients were typically found on the floor by nursing staff. There were challenges implementing effective falls prevention strategies with nearly half of the patients experiencing multiple falls. Falls prevention strategies largely consisted of the provision of equipment. This is likely due to the lack of consideration of communication disability as a risk and contributing factor to falls, and lack of understanding of the circumstances of falls in patients with communication disability following stroke, meaning staff are relying on generic, rather than tailored falls prevention strategies. Health professionals reported difficulties with assessing patients for injury following a fall due to communication disability and that falls in this population affect health professionals personally and professionally.

For health professionals working with patients with communication disability after stroke, providing a targeted, patient-specific falls prevention plan should begin with identification of the intrinsic risk and contributing factors for falls in hospital. By distinguishing the communication disability factors from the cognitive impairment factors and documenting the patient's ability to follow instructions, gain attention and communicate basic needs, health professionals may be prompted to put in place targeted strategies to mitigate these specific falls risk factors. The identification of intrinsic risk and contributing factors for falls in isolation is unlikely to prevent a fall, and health

professionals should consider other factors that may contribute to falls in hospital, including the hospital environment, organisational factors, and the role that family members and visitors may have in supporting the patient during their admission. Including family members and visitors in falls prevention strategies requires health professionals to provide specific training and guidelines to a patient's family members and visitors to mitigate any risk of a fall due to a family member or visitor providing inappropriate support or supervision. Referral to members of the multidisciplinary team who have the skills and expertise to support effective communication (i.e., speech pathologists) may help health professionals implement a tailored, patient-specific falls prevention plan that address the patient's intrinsic risk and contributing factors for a fall.

In relation to falls prevention strategies, health professionals should consider adapting falls prevention and stroke education programs to suit the needs of patients with communication disability following stroke. Such education could include alternative ways to gain attention, the importance of waiting for assistance prior to attempting self-care tasks, and information on physical function changes following a stroke. Further falls prevention strategies may include documentation of functional information relating to suitable adapted education strategies and developing a strong relationship with the patient to help anticipate their needs for assistance.

For speech pathologists, the identification of the communication disability risk and contributing factors for falls may come from extending the findings of assessments to consider the functional implications of a communication disability on hospital safety. Changes to the assessment and documentation practices of speech pathologists to increase the focus on function and providing health professionals with explicit strategies to facilitate care may go some way to helping the multidisciplinary team communicate

with patients. The role of speech pathologists in falls prevention is multifaceted and includes: (a) providing intervention specific to the communication skills of the patient that addresses their risk and contributing factors to falls relating to communication disability; (b) collaborating with health professionals to establish falls prevention strategies across a range of activities undertaken in hospital; (c) tailoring interprofessional therapeutic interventions that involve falls prevention activities (e.g., providing communication aids or adaptations to support a safe transfer); (d) providing health professionals with adapted communication strategies to use during interactions to meet the needs of the patient with communication disability; (e) collaborating with other health professionals to provide adapted falls prevention education that is suitable to the communication skills of the patient and delivered in a communicative accessible environment; (f) supporting patients to communicate the circumstances of any falls after the event using multimodal communication and environmental adaptations; and (g) providing communication partner training to health professionals to enable more effective clinical assessments, and more timely investigations and treatments of any injuries following a fall.

Hospital falls in patients with communication disability after stroke are complex, and specific aspects communication disability have an effect on falls risk assessment, prevention, management. Further specific aspects of communication disability may contribute to a fall in hospital for patients with communication disability following stroke. Health professionals should consider the functional implications of a patient's communication disability when considering falls risks and potential contributing factors to falls and implement falls prevention strategies that specifically target the communication disability. Furthermore, hospital managers should consider communication disability when developing and updating falls prevention policies and

procedures to support health professionals to provide safer, more effective care for these vulnerable patients. Whilst suggestions to enhance falls prevention strategies for patients with communication disability were discussed, there is an urgent need for research into which strategies may be effective for patients with communication disability after stroke.

Falls in hospital patients with communication disability.

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Falls in hospital patients with communication disability.

# Appendices

## Appendix A: Conference Abstracts

### Eastern Health Research Forum

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2022, December 7). *"Unable to express reason for trying to get up" Medical record analysis of falls in patients with communication disability following stroke* [Accepted Conference Presentation – Cancelled due to COVID-19]. 2022 Eastern Health Research Forum.

**Background**: Patients with communication disability following stroke have specific characteristics that have the potential to contribute to falls in hospital, including difficulties accessing the call bell, communicating needs, and following instructions. However, these patients are often excluded from falls research because of their communication disability.

**Aims:** To explore falls in patients with communication disability in relation to: (i) the circumstances leading up to a fall; (ii) the fall incident; (iii) the outcome of the fall; and (iv) the influence of communication disability on falls.

**Methods:** A document data review of medical records and incident reports. Patients with left hemisphere stroke and related communication disability who fell during inpatient rehabilitation were included. Data were analysed according to the Generic Reference Model of patient safety, with descriptive statistics and a content thematic analysis.

**Results:** In total, 109 participants were identified from 1962 records. The 109 participants reportedly experienced 308 falls. Contributing factors included difficulty communicating basic needs, gaining staff attention, and following instructions. Unwitnessed rolls from bed were the most common fall (n=135); occurring when the

patient was reportedly attempting to address an unmet need or taking a risk. Falls also occurred in unknown circumstances (n=22) and when the patient had difficulties following instructions (n=5). Few medical record entries included documentation of strategies relating to communication interventions. Injuries occurred in 15.2% of the falls. Staff reported challenges in assessing patients following a fall and in implementing further falls prevention strategies.

**Conclusion:** Staff recognise and document the impact of communication disability as a potential risk for falls in this group, but falls were often unwitnessed, and patients were unable to describe the fall. Considering this finding, future research should also investigate the role of speech pathologists in falls prevention or management programs for patients with communication disability after stroke.

Falls in hospital patients with communication disability.

**2022 AHSA Convention**

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2022, November 17-19). *Falls in patients with communication disability secondary to stroke: Medical record and incident report analysis* [Technical Research presentation]. 2022 AHSA Convention, New Orleans, Louisiana, United States.

**Abstract:** This study aimed to examine the falls of patients with communication disability following stroke using the Generic Reference Model of patient safety as the analytic lens. With ethical approval, the medical records and incident reports of 109 patients (309 falls) were analysed using descriptive statistics and content thematic analysis. The ability to communicate basic needs and attract staff attention were contributing factors for falls and falls typically occurred due to the patient attempting to address an unmet need or taking a risk. Falls also occurred in unknown circumstances with the patient being found on the floor. Staff reported challenges in assessing patients following a fall and in implementing further falls prevention strategies due to communication disability.

**Long Abstract**

**Main Argument:** Inpatients with stroke are at significant increased risk of falls, with between 14% and 65% of patients with stroke falling at least once during their hospital admission (Batchelor et al., 2012; Walsh, 2016). Falls in hospital impose high-cost impacts on the health service and the patient, including injury, loss of functional capacity, and increased length of hospital stay (K. D. Hill et al., 2007; Morello et al., 2015). Communication disability (e.g., aphasia) is a common sequalae of stroke, affecting an estimated 64% of people with stroke and can lead to barriers for effective communication with healthcare professionals (C. Mitchell et al., 2020; Simmons-Mackie & Kagan, 2007; Sullivan et al., 2020). Patients with communication disability

have unique factors that have the potential to contribute to falls in hospital, including difficulties using the call bell system to gain attention, communicating their needs to staff, and following instructions (Hemsley et al., 2013; Sullivan et al., 2021; Sullivan & Harding, 2019; Sze et al., 2001; Zdobysz et al., 2005b). However, patients with communication disability are often excluded from falls research because of their communication impairments (Hemsley et al., 2019). The aims of this study were: (a) to apply the Generic Reference Model (W. B. Runciman et al., 2006) to examine the falls of patients with communication disability following stroke in inpatient rehabilitation settings, including the circumstances leading up to and potentially contributing to the fall, the fall incident, and the outcome of the fall on both the affected patient and the hospital; and (b) to examine the content of hospital staff reports on falls as documented in medical records and incident reports for any written comments relating to communication disability that would provide insights as to this patient group's risk for falls or prevention strategies. This information may help inform future research, understand falls risk, and develop strategies that are inclusive of this population.

**Method:** This ethically-approved mixed-methods study involved review of hospital patient medical records and patient safety incident reports for all adult patients admitted to rehabilitation wards with stroke across 2 hospitals and 2 wards over an eight-year period (2013 – 2021). Participants were eligible for inclusion if they were admitted to one of the rehabilitation wards following a left hemisphere stroke with associated communication disability, and who had a documented fall or near miss fall during their rehabilitation admission. Data was analysed according to the factors within the Generic Reference Model with each factor in the model forming a code for categorical analysis. Further, a content thematic analysis was also completed, applying

open content codes to categories of meaning and looking across the data for connecting themes or relationships.

**Results:** We included 109 participants and their medical record or safety incident data related to 308 falls (including 18 near miss falls). Participants had a documented diagnosis of aphasia, dysarthria, apraxia of speech, or cognitive communication disability, in isolation or in combination. Communication disability was identified as a risk factor for a fall, usually by physiotherapists or occupational therapists, specifically in relation to the patient having difficulty following instructions. Prior to the first fall, falls prevention strategies often involved the provision of equipment such as floor line beds, or bed/chair alarms. In relation to communication disability, falls prevention strategies involved adaptations staff needed to make when communicating with participants during tasks such as transferring. In half of the total number of falls, the contributing factor identified was due to patient impairment (e.g., in mobility). The patient's ability to gain staff assistance (e.g., use the call bell), and the patient's ability to communicate their basic needs were also contributing factors for falls. The most common circumstance of a fall was a roll from a floor line bed to either the floor or a crash mat, accounting for almost half of the total number of falls. Falls occurred: (a) due to the participant experiencing an unmet need (e.g., toileting); (b) due to the participant taking a risk; (c) in unknown circumstances due to the severity of the participant's communication disability preventing their ability to describe what happened; and (d) due to the participant's difficulties following instructions. Falls occurred across the day and night and nursing staff were the most common witnesses to a fall, however, more than half of the falls were unwitnessed. Medical doctors reported that participants with communication disability were difficult to examine for injury, particularly those with severe communication disability who were unable to follow

instructions or communicate their basic needs. Staff also reported there were difficulties implementing further falls prevention strategies due to communication disability and participants experiencing falls in unknown circumstances.

Patient injuries occurred in 15.2% of the falls. Other outcomes for the patient included: (a) undergoing additional investigations, such as x-ray, to check for injuries; and (b) changes to mobility and equipment provision to limit unsupervised use. For the organisation there were financial and resource impacts.

**Conclusion:** This study used the Generic Reference Model of patient safety to analyse the 308 falls of 109 hospital patients with communication disability following stroke. Unwitnessed rolls from the bed were the most common fall and falls that occurred due to patients attempting to address and unmet need or taking a risk were often related to difficulties communicating basic needs, gaining attention from staff, and following instructions. The provision of equipment appeared to be the most common falls prevention strategy employed and there are challenges for staff in implementing additional strategies, particularly for patients with severe communication disability who experience multiple falls. These findings should be considered in relation to designing further research that is inclusive of patients with communication disability. Implications for speech-language pathologists will be presented and discussed as key health professionals working with hospital patients with communication disability following stroke and with an important role in relation to patient safety for this group.

**Learning outcomes**

- Participants will be able to describe the circumstances and outcomes of falls in patients with communication disability following stroke
- Participants will be able to explain the relationship between aspects communication disability following stroke and falls

Falls in hospital patients with communication disability.

- Participants will be able to discuss the potential role of speech pathologists in preventing falls in patients with communication disability following stroke

Falls in hospital patients with communication disability.

**14th World Conference on Injury Prevention & Safety Promotion**

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2022, November 27 – 30). *Stroke, communication disability, and falls: Analysis of medical records and safety incident reports* [Rapid Fire presentation]. 14th World Conference on Injury Prevention & Safety Promotion, Adelaide, South Australia, Australia.

**Background:** Patients with communication disability following stroke are at increased risk for adverse events including falls. However, they are often excluded from falls research, and little is known about the circumstances and outcomes of their falls. Understanding more about falls among this population will help inform policy and practice aiming to improve their safety in hospital.

**Method:** This cohort study analysed matched medical records and patient incident reports for patients with communication disability after stroke who had at least one fall during inpatient rehabilitation.

**Results:** The study included 109 patients with 308 falls. Prior to the first fall, 48% of participants had falls prevention strategies in place. Documents examined suggested that patient factors (e.g., balance) contributed to half of all falls, but no contributing factors were identified in a third of the falls. The most common type of fall was 'unwitnessed rolls from bed' (44%). Falls occurred across the day and night, and injuries occurred in 15% of falls. Financial and resource impacts on the hospital system included additional staffing and patient investigations.

**Conclusion:** This study presents the circumstances, outcomes, and potential contributing factors for falls in patients with communication disability following stroke. Patient factors were the most often identified contributing factor. Where patients were unable to describe the fall, the circumstances were unclear. Understanding the reasons why patients are attempting to get out of bed may identify ways to reduce the risk and

incidence of falls in this population. Observational studies of this group may identify the circumstances leading up to their falls.

Falls in hospital patients with communication disability.

**14th World Conference on Injury Prevention & Safety Promotion**

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2022, November 27 – 30). *Falls, stroke, and communication disability: Content analysis of medical records and incident reports* [Conversation Starter presentation]. 14th World Conference on Injury Prevention & Safety Promotion, Adelaide, South Australia, Australia.

**Background:** Patients with communication disability following stroke are often excluded from falls research. This researched aimed to identify the circumstances of falls in hospital in patients with communication disability following stroke.

**Method:** Matched medical records and incident reports from patients with communication disability after stroke who experienced a fall in hospital were examined according to the Generic Reference Model of Patient Safety. Qualitative coding informed a content thematic analysis.

**Results:** Records of 109 patients who experienced 308 falls were analysed. Five main themes and two sub-themes were identified: (1) communication disability sometimes being described as a risk factor; (2) falls prevention strategies largely focus on mitigating physical risk factors; (3) the perception of falls as a consequence of unmet patient needs or risk-taking behaviours; (4) the patient's inability to describe the circumstance of the fall; and (5) post fall patient assessments were difficult to complete. Subthemes relating to contributing factors for falls were the patient's ability to gain staff attention and communicate needs.

**Conclusion:** This study provides insights into the falls of patients with communication disability following stroke. Falls related to unmet and risk-taking behaviours may be preventable if patients are able to communicate their needs and gain attention from staff. Future research should investigate strategies that may contribute to improved falls prevention and management for patients with communication disability

after stroke. Harnessing the expertise of speech pathologists in identifying communication-related risk and enabling improved communication may help to enhance safety in patients with communication disability following stroke.

Falls in hospital patients with communication disability.

**9th Biennial Australia and New Zealand Falls Prevention Conference**

Sullivan, R., Harding, K., Hemsley, B., & Skinner, I. (2021, December 1 - 3). *Falls in patients with severe communication disability following stroke: A chart review* [5x5 presentation]. 9th Biennial Australia and New Zealand Falls Prevention Conference, Online virtual conference.

**Background:** Patients with severe communication disability following stroke are at high risk of falls during their inpatient hospital admission. They have difficulty using the call bell, communicating their basic needs, and participating in falls prevention education. To date, these patients have largely been excluded from falls research and little is known about the circumstances of their falls in hospital. This study aimed to examine the falls of patients with severe communication disability following stroke, including the circumstances leading and potentially contributing to the fall, the fall incident, and outcomes of the fall. This knowledge may help develop specific falls prevention strategies for this vulnerable population.

**Methods:** A retrospective and prospective medical record chart review and review of incident reports on falls from two rehabilitation wards, was completed over the eight years of 2013-2021. Data was analysed qualitatively according to the Generic Reference Model of Patient Safety.

**Results:** The medical records and incident reports of 50 participants with severe communication disability following stroke were matched and examined. The data reflected patients experienced multiple, unwitnessed falls from bed. Falls in other circumstances were less common. Intrinsic factors, failure or misuse of equipment, and the impact of other people contributed to the falls. Severe injury was rare, however there were disruptions or changes to the rehabilitation journey for these patients. Hospitals incurred increased resources in (a) employing more staff, (b) increase

‘rounding’, and (c) hiring bed chair alarms, low-low beds, and extra scans following falls. The inclusion of the patient in falls education, and the engagement of family or visitors for assistance in falls management or falls prevention education was rare.

**Conclusions:** The circumstances of falls in patients with severe communication disability following stroke differ from the current falls literature in patients with stroke, indicating that this population require specific falls prevention strategies.

Falls in hospital patients with communication disability.

**Virtual Pre-Conference Global Injury Prevention Showcase**

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2021, March 22 - 26). *Systematic review and meta-analysis of hospital falls in people with stroke* [Long Oral presentation]. Virtual Pre-Conference Global Injury Prevention Showcase. Online virtual conference.

**Background:** People with communication disability following stroke have a significantly increased risk of patient safety incidents in hospital. This review aimed to identify any association between communication disability following stroke and falls in hospital, and to understand more about the circumstances surrounding the falls to inform future research and identify clinical implications.

**Method:** In July 2019, a systematic review of scientific literature on the hospital falls of people with stroke was conducted. Both descriptive analysis and meta-analysis were completed.

**Results:** From 5036 records screened by title and abstract, 162 full text articles were retrieved. 15 studies met inclusion criteria. Falls commonly occurred in the bedroom, during transfers. Meta analysis (n=11) showed no significant association between falls and communication disability. Overall, diagnosis and severity of communication disability were poorly reported in the studies.

**Conclusion:** Research to date reflect no association between communication disability and falls. However, studies lack sufficient data on the diagnostic profile and severity of communication disability for participants with stroke. There is little attention to the environmental factors surrounding falls. Future falls research for this group should include information on diagnosis and measures of severity of communication disability and greater attention to the circumstances leading up to, occurring during, and following the falls.

Falls in hospital patients with communication disability.

**Learning Outcomes:**

- To understand the evidence on any association between communication disability and falls in hospital patients with stroke.
- To identify any clinical implications for improving the safety for hospital patients with stroke and communication disability.

Falls in hospital patients with communication disability.

## Appendix B: Conference Posters

### 15th National Allied Health Conference

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023, August 7 - 9). *"It can be very daunting" Clinician views and experiences on falls in hospital patients with communication disability* [Poster] 15th National Allied Health Conference, Perth, Western Australia, Australia.

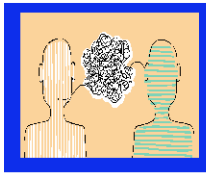
**Background:** Patients with communication disability following stroke have unique factors that contribute to their falls in hospital including difficulties communicating basic needs and attracting attention from staff. These patients often experience unwitnessed rolls from bed whilst trying to meet a basic need or taking a risk. This study aimed to explore the views of health professionals regarding the impact of communication disability on falls in hospital patients with communication disability following stroke.

**Method:** Online clinician focus group discussion. Qualitative coding informed a content analysis.

**Results:** Eleven clinicians participated in four focus groups; three main themes were identified. Clinicians reported: (a) barriers exist to standard falls prevention being effective which include communication disability and cognitive impairment; (b) falls are challenging and have impacts on both patients and staff; and (c) more needs to be done to prevent falls in this population including utilising the skills of speech pathologists to adapt falls prevention education and providing a more holistic team approach to patient safety.

**Conclusion:** This study suggests that there are gaps in hospital falls prevention and management strategies for patients with communication disability. Further, staff report managing falls in patients in these patients is personally and professionally

challenging. Further co-designed research should investigate strategies that may contribute to enhanced falls prevention and management for patients with communication disability after stroke.



# "It can be very daunting" Clinician views and experiences on falls in hospital patients with communication disability

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1: University of Technology Sydney 2: Eastern Health, Victoria, Australia 3: La Trobe University, Victoria, Australia 4: Charles Sturt University, Port Macquarie Australia

## Introduction

Patients with communication disability following stroke have unique factors that contribute to their falls in hospital including difficulties communicating basic needs and attracting attention from staff. These patients often experience unwitnessed rolls from bed whilst trying to meet a basic need or taking a risk.

## Aim

This study aimed to explore the views of health professionals regarding the impact of communication disability on falls in hospital patients with communication disability after stroke.

## Method

Clinicians across Victoria, Australia working with patients with communication disability following stroke were recruited to online focus groups via social media. Data analysed qualitatively using a thematic content analysis. 11 clinicians (6 nurses, 3 speech pathologists and 2 medical doctors) participated in one of four focus groups. Participants had from 2 to 19 years' experience working with people with stroke and communication disability.

## Results

Three main themes were identified:

(a) Falls in patients with communication disability are challenging,
(b) Communication disability is a barrier to effective falls prevention, and
(c) Falls prevention requires multiple, specific strategies including relationships with patients and family; multidisciplinary teamwork; and inclusion of speech pathologists in the falls team.

**PUBLICATIONS:**


- Sullivan, R., Hemsley, B., Harding, K., & Skinner, I (2023). 'Patient unable to express why he was on the floor, he has aphasia.' A content thematic analysis of medical records and incident reports on the falls of hospital patients with communication disability following stroke. *International Journal of Language & Communication Disorders*. [early online]
- Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2023). Falls in Patients With Communication Disability Secondary to Stroke. *Clinical Nursing Research 32*(3), 478-489


Scan Me

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## Falls are challenging

Falls impact patients, clinicians and the health service

*"this is complicated... kind of like make you feel like you don't really know what to do or not really good at your job"*

*"They might not feel 100%, they don't want to do any therapy... it terms of actually interrupting their rehab journey, it definitely does."*

## Communication disability is a barrier to effective falls prevention

**"It's not often considered that even communication might be a factor"**

**It's hard to understand the circumstances of some falls**
*"I'm trying to take a guess of what really happened"*

**Assessing and treating patients with a communication disability after a fall is difficult**
*"If he or she can't explain the level of the particular ailment ... to a doctor, how do you expect the doctor to commence treatment? The treatment process is also affected."*

**Communication disability contributes to falls**
*"They're having trouble communicating that they need help so they're more likely to just go and do something themselves"*

## Clinical Implications and Future Research

Including communication specific falls risk and contributing factors on assessment/screening forms/checklists or in clinical judgement of falls risk

Adapted falls prevention education materials

Training staff in supported communication techniques

These areas of research may lead to improvements in the falls incidence rate and management plans for patients with communication disability following stroke through mitigation of these risks.

## Falls prevention requires many specific strategies

**"Falls are often multifactorial, so there's not going to be one strategy... we need multiple, multiple strategies"**

**Relationships with Patients**
*"Relationship matters. Gets you more used to them. Knowing what they need at a particular time is very important"*

**Relationships with Family**
*"Sometimes you have to have someone who can keep an eye on them"*

**Multidisciplinary teamwork**
*"What are the risk of this... and how can we apply strategies, but I guess that requires the team to work more collaboratively rather than in silos"*

*"Even having the speech pathologist work with the rest of the team in continence management... how is a person going to ... request that they need to go to the toilet?"*

## Roles for speech pathologists

***"They have a very big role"***

**Identifying specific communication disability risks for falls**
*"If they can't express their wants and needs, how does that... have a functional impact on what they're doing in their day-to-day environment in the hospital?"*

**Adapted falls prevention education**
*"[the speech pathologists] are giving orientation on how to go about their day-to-day activities while they still in the hospital."*

**Assisting in the assessment of injury following a fall**
*"Using AAC and not only getting the patient to express if there's any pain or injury after a fall, but trying to work out why they may have fallen."*

## Conclusion

Healthcare providers working with patients with communication disability after stroke:

- *Perceive* that falls in this population are complex and personally and professional challenging
- *Identify* that communication disability contributes to and impacts on falls assessment and prevention strategies, but was not often considered
- *Identify* that communication disability following stroke requires a team approach to implement multiple, patient specific strategies

**There are *gaps* in hospital falls prevention and management strategies for patients with communication disability that need to be addressed.**

Funding: This research was supported by an Australian Government Research Training Scholarship and a Jumbunna Institute Postgraduate Research Scholarship. Contact: Rebecca.Sullivan-1@student.uts.edu.au

Falls in hospital patients with communication disability.

**Speech Pathology Australia National Conference 2021**

Sullivan, R., Harding, K., Skinner, I., & Hemsley (2021, May 31 – 2 June). *A systematic review of falls in hospital patients with left hemisphere stroke and acquired communication disability secondary to stroke* [Poster]. Speech Pathology Australia National Conference 2021, Online virtual conference.

**Background:** Patients with communication disability following stroke have a significantly increased risk of patient safety incidents in hospital. Some studies have suggested that patients with communication disability may have an increased risk for falls following stroke, but the nature and extent of any association is not well understood.

**Aim:** The aim of this review was to (a) identify any association between communication disability secondary to left hemisphere stroke and falls in patients in hospital and (b) describe the characteristics and outcomes of the falls in patients.

**Method:** A systematic review of the literature was conducted in July 2019. The search strategy combined concepts of stroke, falls and hospital across five scientific databases to find relevant literature in English. Inclusion and exclusion criteria were applied by two raters and a third rater resolved any discrepancies.

**Results:** We screened the abstracts and titles of 5036 records and the full text of 162 articles. We included 15 studies in the review. Falls commonly occurred in the bedroom and during transfers. Meta analysis (n=11) showed no significant association between falls and communication disability. Overall, diagnosis and severity of communication disability were poorly reported in the studies.

**Conclusion:** Research to date reflect no association between communication disability and falls. However, studies lack sufficient data on the diagnostic profile and severity of communication disability for participants with stroke. There is little attention

to the environmental factors surrounding falls. Implications for speech pathologists (e.g., their role in falls prevention programs and accessible education) and for patients with communication disability will be presented and discussed.

**Keywords (10 words):** Falls; stroke; communication disability; hospital; patient safety

Falls in hospital patients with communication disability.

# Falls in hospital patients with acquired communication disability secondary to stroke: A systematic review and meta-analysis

Rebecca Sullivan[1,2], Dr. Katherine Harding[2,3], Dr. Ian Skinner[4] and Professor Bronwyn Hemsley[1]

1:Graduate School of Health, University of Technology Sydney, 2:Eastern Health, Box Hill, Melbourne Australia; 3: La Trobe University, 4:School of Community Health, Charles Sturt University

## INTRODUCTION

Falls are a common safety incident in people with stroke with up to 65% of people falling during their hospital admission.

Communication disability following stroke (i.e., aphasia, dysarthria, apraxia of speech and cognitive communication deficits) has has not been closely examined as a potential risk factor for falls in people with stroke.

## AIM

To determine the association between communication disability secondary to stroke and falls in people with stroke in hospital.

## METHODS – Scan for Prospero record

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**Inclusion criteria**

- Peer reviewed full paper of original research, written in English
- Adult participants admitted to acute or subacute hospital services following stroke
- Data on falls for patients with and without communication disability

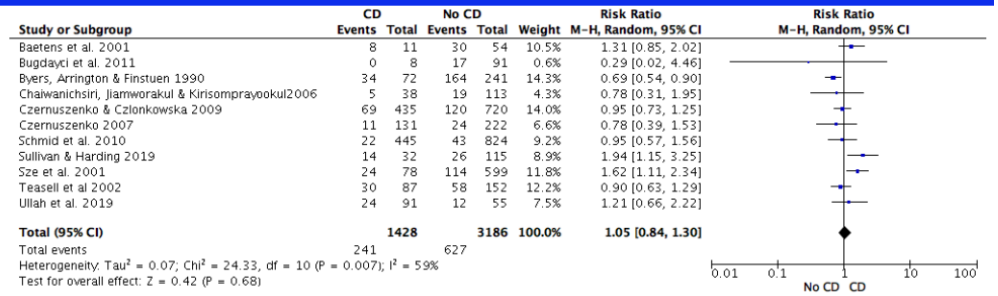
**Search Terms**

Concepts of 'falls', 'hospital' and 'stroke'

## RESULTS N = 15 Studies

### Communication Disability

- 33.5% prevalence
- Aphasia most reported
- Not routinely diagnosed by a speech pathologist
- Limited information about severity
- Exclusion of people with severe communication disability




**Meta-analysis of relationship between falls and communication disability**

No statistically significant association between participants with communication disability and risk of falls in hospital

### People with severe communication disability have difficulties:


- Communicating needs to staff
- Understanding safety instructions
- Using the call bell
- Understanding falls prevention education

May take risks that increase their risk of falls

### To potentially reduce falls, speech pathologists can:

- Adapt falls prevention education to make it aphasia friendly
- Collaborate with:
  - Physiotherapists and occupational therapists during therapy to model individualised instructions suitable for the patient's communication needs
  - Nurses to support the patient gaining attention and to model strategies to support the patient communicating their needs

References

Sirriyeh, R., Lawton, R., Gardener, P. and Armitage, G., 2011, Reviewing studies with diverse designs: the development and evaluation of a new tool. *Journal of Evaluation in Clinical Practice, 1-7*

Acknowledgments

This research has been funded by an Australian Government Research Training Program Scholarship and a Jumbunna Postgraduate Research Scholarship.

The authors would like to thank and acknowledge the work of Dr Joanne Steel who was engaged as a research assistant in the study.

SCAN ME

Scan to read the published journal article

E: rebecca.sullivan-1@student.uts.edu.au @BeckSullivanSLP #MyDeadlyPhD

Falls in hospital patients with communication disability.

**Speech Pathology Australia National Conference 2021**

Sullivan, R., Skinner, I., Harding, K., & Hemsley, B. (2021, May 31 – 2 June). *A review of hospital and health service falls policies in Australia: failing to consider or empower people with communication disability* [Poster]. Speech Pathology Australia National Conference 2021, Online virtual conference.

**Background:** Patients with communication disability secondary to stroke have unique factors contributing to their falls in hospital. The needs of this population should be considered in the health services policies and documents relating to falls prevention in hospital.

**Aim:** To determine how hospital policies and guidelines consider patients with communication disability in relation to falls risk assessment, falls prevention or management.

**Method:** A focus hospital in Victoria was selected to identify relevant local, state, and national policies guiding practice on hospital falls risk and prevention. In July 2020, 8 relevant websites were searched, locating of 50 documents which were then subject to an inductive content analysis utilising a generic patient safety framework.

**Results:** Across the policy documents at a local, state, and national level there was scant information relating to considering a patient's communication disability in relation to falls risk, prevention, or management. Communication appeared almost exclusively in relation to (a) risk specifically for those with cognition decline due to dementia/delirium; and (b) falls prevention in the need for patients to be able to reach and use a call bell, and their glasses and hearing aids. There is a reliance on family members for engagement with patients at risk of falls, and scant guidance to use pictures or gestures to supplement understanding, largely related to patients with English as a second language.

Falls in hospital patients with communication disability.

**Conclusion:** Given the strong themes and saturation in the data in this sample of policy documents, it is likely that the identification and needs of patients with communication disability is absent in falls policies and guidance for hospitals in Australia.

**Keywords (10 words):** Falls; stroke; communication disability; hospital; patient safety; policy

# A review of hospital and health service falls policies in Australia: Failing to consider or empower people with communication disability

Rebecca Sullivan[1,2], Dr. Ian Skinner[3], Dr Katherine Harding[2,4] and Professor Bronwyn Hemsley[1]

1:Graduate School of Health, University of Technology Sydney, 2:Eastern Health, Box Hill, Melbourne Australia; 3:School of Community Health, Charles Sturt University, 4: La Trobe University

## INTRODUCTION

Falls in hospital account for 38% of documented adverse events in hospital.

Patients with communication disability have unique risk factors that contribute to falls. There are gaps in the research literature examining hospital falls prevention policies on the care of patients with communication disability in either falls risk screening or falls prevention programs.

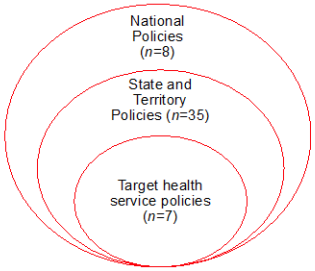
## AIM

1. How the content of policies on falls relates to the screening for falls risk, falls risk assessment, falls prevention, or falls management for patients with communication disability; and
2. Identify gaps in policy that need to be addressed either by the translation of recent research into policy statements or by the conduct of new falls research that is inclusive of patients with communication disability

## METHODS

**Scoping Review and Content Analysis:**

- Policies and related documents from a target health service in Victoria, Australia and relevant Australian state and territory health departments
- National Guidelines
- Consumer information on falls prevention




**Type of Included Documents *N* = 50**

National Guidelines *n* = 4

Guidelines or Policy *n* = 12

Assessment Tool *n* = 9

Falls Prevention *n* = 4

Staff Information *n* = 8

Consumer Information *n* = 12

## RESULTS


**Patients with communication disability have difficulties:**


- Communicating needs with hospital staff
- Gaining attention and using the call bell
- Participating in falls prevention education

∴ have unique risk factors contributing to falls

May take risks that increase their risk of a fall

## CONCLUSION

**Current falls policies do not adequately consider patients with communication disability.**

Future research should include:

- Ways of reducing the risk of falls in patients with communication disability
- The benefit of providing adapted fall prevention education

May inform new falls prevention policies in hospital

**Acknowledgments**

This research has been funded by an Australian Government Research Training Program Scholarship and a Jumbunna Postgraduate Research Scholarship.

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Falls in hospital patients with communication disability.

**Speech Pathology Australia National Conference 2020 (cancelled due to COVID-19)**

Sullivan, R., Harding, K., Skinner, I., & Hemsley (2020, May 24 – 17). *A systematic review of falls in hospital patients with left hemisphere stroke and acquired communication disability secondary to stroke* [Accepted Conference Presentation]. Speech Pathology Australia National Conference 2020, Darwin, NT, Australia.

**Background:** Patients with communication disability following stroke have a significantly increased risk of patient safety incidents in hospital. Some studies have suggested that patients with communication disability may have an increased risk for falls following stroke, but the nature and extent of any association is not well understood.

**Aim:** The aim of this review was to (a) identify any association between communication disability secondary to left hemisphere stroke and falls in patients in hospital and (b) describe the characteristics and outcomes of the falls in patients.

**Method:** A systematic review of the literature was conducted in July 2019. The search strategy combined concepts of stroke, falls and hospital across five scientific databases to find relevant literature in English. Inclusion and exclusion criteria were applied by two raters and a third rater resolved any discrepancies.

**Results:** We screened the abstracts and titles of 5036 records and the full text of 162 articles. We included 24 studies in the review. The studies provide insights into various risk factors for falls in these patients, and several characteristics according to location, timing or injury rates of falls and risk assessment models. The analysis of included studies will be presented at the conference.

Falls in hospital patients with communication disability.

**Conclusion:** The preliminary findings of this review indicate that the literature on the falls of patients with communication disability following stroke is growing. Implications for speech pathologists (e.g., their role in falls prevention programs and accessible education) and for patients with communication disability will be presented and discussed.

**Keywords (10 words):** Falls; stroke; communication disability; hospital; patient safety

Falls in hospital patients with communication disability.

## Appendix C: Three Minute Thesis Competitions

### University of Technology Three Minute Thesis Competition

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023, July 6). *"Found patient on the floor" Hospital falls in patients with communication disability after stroke*. Presented at the University of Technology Sydney Faculty of Health Three Minute Thesis Competition.

Sullivan, R., Hemsley, B., Harding, K., & Skinner, I. (2023, June 21). *"Found patient on the floor" Hospital falls in patients with communication disability after stroke*. Presented at the University of Technology Sydney Graduate School of Health Three Minute Thesis Competition.

"*We're in a hospital, on the stroke ward. The emergency buzzer goes off and the nurses rush to Ron's room. His nurse has found him on the floor again, the third time since he came in. He's been incontinent. They don't ask him what happened because he has aphasia – a communication disability after his stroke. My systematic review of the literature showed there isn't much evidence to help clinicians understand the circumstances of falls in patients like Ron. Ron is frustrated. He's rolled out of bed again trying to get to the toilet. He can't get the nurses attention and even if he could - he can't tell them what he needs. My analysis of medical record and incidents report of patients with stroke who fell, reflect that being unable to gain attention and communicate basic needs are just 2 contributing factors to falls in patients with communication disability following stroke. However, my focus group clinicians say they don't often consider communication disability in relation to falls. Ron fell while he was trying to meet a basic need – toileting. Medical record and incident report reviews reveal other patients fall when they are taking risks and when having*

*trouble following instructions. Some patients like Ron fall and it's unclear why, or what happened. Ron's nurse feels like they aren't good at their job. Focus group clinicians told me they find falls in patients with communication disability after stroke daunting. It's hard to know what to do. They haven't given Ron falls prevention education, even though hospital policy says they should. The education is not modified to help people with communication disability understand it. The doctor checks Ron to see if he has any injuries - they have trouble assessing him and Ron can't tell the doctor much. Later, his nurse notices he's calling out in pain. Clinicians told me that the difficulties assessing his injuries mean there's been a delay to his treatment. Clinicians agree that falls prevention for patients with communication disability following stroke, requires multiple strategies. They think the environment around Ron's hospital bed should have the things he needs so he isn't trying to reach it. His family might need to come and sit with him for extra supervision and support. The nurses want to build a stronger relationship with him to help anticipate his needs. Clinicians also felt speech pathologists could contribute to a falls prevention plan that includes collaborative assessment and goal setting. The clinicians agree that they need more awareness of how communication disability relates to falls and more skills to communicate with patients like Ron about falls. Falls prevention research needs to investigate ways to include communication disability into falls screening tools and to establish adapted falls prevention education materials. What we know now may lead to improvements in the falls incidence rate and management plans for patients with communication disability following stroke. This will help prevent falls so that patients like Ron be safe in hospital."* Rebecca Sullivan 3MT Script

Falls in hospital patients with communication disability.

Falls in hospital patients with communication disability.

**Eastern Health Three Minute Research Competition**

Sullivan, R., Harding, K., Skinner, I., & Hemsley, B. (2020, October 15). *Falls in hospital patients with acquired communication disability secondary to stroke.* Presented at Eastern Health Three Minute Research Competition. Online virtual event.

*"It hurts and can be fatal. And that's exactly what happened to Mary. She fell in hospital and died as a result. Mary was a patient with stroke and like 88% of people with stroke, had a communication disability. Mary had aphasia and this meant that she couldn't understand what we were saying to her, and she couldn't tell us what she needed. Like 65% of people with stroke, she fell in hospital. Mary had risk factors for a fall, balance impairment and dependence for ADL's – but did her severe communication disability also play a role in her fall? Could anything more have been done to prevent her falling? I wanted to find out, I enrolled in a PhD. So far, I have conducted 3 literature reviews with different aims and methods. The first, a systematic review of 15 papers showed no statistical association between a generic diagnosis of communication disability and falls in hospital. However, people with communication disability weren't well represented because over half of the studies excluding people with severe stroke. This is important because we know that 99% of people with severe stroke have a communication disability. Also only 3 studies involved a speech pathologist to assess communication. My second narrative review found people with stroke commonly fall next to their bed, during the day, when they are attempting to transfer. My policy review indicated that patients who had trouble following instructions were more at risk of falls and that ALL patients should be given falls prevention education. I found no guidance for staff about how to*

*provide education to people who have a communication disability. Addressing the risk of falls in people with communication disability is challenging but important. Patients like Mary may have difficulty understanding instructions on how to transfer, or use the call bell or to wait for assistance to walk. When the chair alarm goes off, they might not tell us what they need and then take risks like walking to the toilet alone rather than being found in wet sheets. My PhD involves examining the falls in patients with stroke communication disability. I'm using medical records and incident reports, conducting focus groups with health professionals and discussing the findings with an expert panel. By knowing when, where and what contributes to the falls in this vulnerable population, I'm hoping to identify specific falls prevention approaches to meet their communication needs. I hope to prevent patients like Mary from falling, keeping them safer, giving them a better chance to return home."* Rebecca Sullivan Eastern Health Three Minute Research Competition

Falls in hospital patients with communication disability.

**Falls in hospital: a failure to consider or empower people with communication disability secondary to stroke**

**Appendix D: Awards**

# Graduate School of Health

## 2023 Three Minute Thesis (3MT) Competition

This is to certify that

Rebecca Sullivan

is the **Winner** of the Graduate School of Health - University of Technology Sydney 3MT Competition on 21 June 2023.

Production Note:
Signature removed prior to publication.

A/Prof Mojtaba Golzan
Acting Deputy Head of School – Research

3MT® THREE MINUTE THESIS
FOUNDED BY THE UNIVERSITY OF QUEENSLAND

Falls in hospital patients with communication disability.

# Graduate School of Health

## 2023 Three Minute Thesis (3MT) Competition

This is to certify that

Rebecca Sullivan

is the **People's Choice Winner** of the Graduate School of Health - University of Technology Sydney 3MT Competition on 21 June 2023.

Production Note:
Signature removed prior to publication.

A/Prof Mojtaba Golzan
Acting Deputy Head of School – Research

3MT® THREE MINUTE THESIS
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## Appendix E: Prospero Protocol

NIHR | National Institute for Health Research

PROSPERO
International prospective register of systematic reviews

# A systematic review of falls in hospital patients with left hemisphere stroke and acquired communication disability secondary to stroke

### Citation

Rebecca Sullivan, Bronwyn Hemsley, Katherine Harding, Ian Skinner. A systematic review of falls in hospital patients with left hemisphere stroke and acquired communication disability secondary to stroke. PROSPERO 2019 CRD42019137199 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019137199

### Review question

1. What, if any, is the association between communication disability secondary to stroke, or left hemisphere stroke (and associated increased risk of communication disability) and falls in patients in hospital?

2. What are the characteristics and outcomes of falls of hospital patients with left hemisphere stroke or communication disability secondary to stroke, including any factors leading up to, occurring during, or following the falls?

### Searches

In June 2019, a search of the following electronic bibliographic databases will be conducted: CINAHL, EMBASE, MEDLINE, PsycINFO, Web of Science. The search strategy will include terms relating to the population (inpatients and stroke) and the outcome (falls). There will be no restriction on date; however, as the reviewers only read and speak in English, there will be an English Language restriction.

Forward and backward citation searches on the included studies will be conducted so that any potentially relevant citations can also be considered for inclusion. In addition, the reference sections of all eligible and included studies will be reviewed manually to identify any further potentially relevant studies to be considered against the inclusion criteria. An author search of the first author of each included study will be conducted using Scopus and Google Scholar to identify any other potentially relevant studies not captured through electronic searching or reference checking that can be considered against the inclusion criteria as for other potentially relevant studies located in the search of scientific databases.

### Types of study to be included

Inclusion: Original, peer-reviewed full papers in English relating to adults; quantitative, qualitative, or mixed methods designs, including quasi-experimental designs, and randomised control trials. Cohort or case controlled trials are expected to be used to answer the first research question. Studies will be included if data pertaining to the rate or nature of falls in patients with stroke related communication disability or left hemisphere stroke is described or analysed.

Exclusion: Studies not in English; studies relating to children; systematic reviews and synopsis papers, conference abstracts, editorials and responses to articles, commentaries, news, letters, and opinion pieces. Studies without results relating to the risk or nature of falls in patients with stroke related communication disability (as defined above).

### Condition or domain being studied

Left hemisphere stroke, acquired communication disability, falls in hospital.

Acquired communication disability includes the following diagnosis secondary to the stroke:

• Aphasia

• Apraxia

• Dysarthria

Falls include falls and near-miss of falls.

## Participants/population

Inclusion: Adults admitted to hospital with a diagnosis of left hemisphere stroke, and adults admitted to hospital with aphasia or other acquired communication disability secondary to stroke.

Exclusion:

• Infants/children (under 18)

• Patients with conditions other than stroke

• Patients not admitted to hospital

• Patients who have communication difficulties due to English as a second language

• Patients with communication disability not secondary to left hemisphere stroke

• Patients in falls prevention programs outside the hospital setting

## Intervention(s), exposure(s)

The dependent variable of interest is falls in hospital. This is not a review of intervention studies (e.g. studies aiming to reduce the risk of falls; falls prevention programs).

## Comparator(s)/control

The independent variables are presence of at least one of the following factors:

1. a left hemisphere stroke and hence increased risk of communication disability;

2. aphasia or other communication disability secondary to stroke.

This review will include studies that present comparative data on falls in people with left hemisphere stroke or communication disability secondary stroke with falls in people without these characteristics.

## Context

Studies in hospital only.

## Main outcome(s)

To determine whether left hemisphere stroke or communication disability secondary to stroke is associated with an increased risk of in-hospital falls, and the nature of that association.

To identify documented characteristics and impacts of falls in adult hospital patients with left hemisphere stroke or patients with communication disability secondary to stroke.

## Measures of effect

Not applicable

## Additional outcome(s)

None

## Measures of effect

Not applicable

## Data extraction (selection and coding)

All included studies will then be entered into the Data Extraction phase, completed by two reviewers.

The data to be extracted from the included studies will be as follows:

• First author

• Year

• Country

• Study design (Qual / Quant / Mixed / Descriptive)

• Study design (methods e.g., randomised controlled trial/interviews/focus groups/chart review/observations)

• Aim of the study (categories)

• Participant characteristics

• Age

• Gender

• Type of stroke (Left hemisphere stroke or more specific)

• Severity of stroke (if noted)

• Other patient details noted (hemiplegia / mobility / cognition)

• Length of stay

• Time from stroke onset to admission

• Communication disability

• Type

• Severity

• Measures

• Description/nature/function

• Hospital setting or ward

• Outcome Measures

• Falls / Incidents

• Statistical analysis type

• Results/main findings

• Falls (e.g. rate, number, or presence/absence of falls) in groups with/without communication disability; other comparative statistics including odds ratios, risk ratios or incident rate ratios

o Fall characteristics: Incident type, location, time of day, activity during fall, reported impacts (injury rates, increased length of stay or cost of care).

• Directions for future research noted

Data extraction will be completed by the first author and checked by a research assistant to increase confidence in the accuracy of the data extraction process.

## Risk of bias (quality) assessment

Risk of bias of the included studies will be assessed using the Quality Assessment Tool for Studies with Diverse Designs (QATSDD). The 16-item tool is a validated quality assessment tool, applicable to research with heterogeneous study designs.

The risk of bias assessment will be completed by the first author and checked by one other member of the research team.

## Strategy for data synthesis [1 change]

We will use summary data to conduct a random effects meta-analysis. The primary outcome measure will be the risk for falls in patients with communication disability in hospital. The meta analysis will only be performed if there is sufficient homogeneity between studies. To be considered for meta-analysis, studies will provide consistent definitions of communication disorders will be required (e.g. description of aphasia, dysarthria, apraxia of speech) or consistent measures of communication disability (e.g. use of Functional Independence Measure).

A qualitative meta-synthesis of descriptive and qualitative findings related to the nature of falls of patients with aphasia or communication disability secondary to left hemisphere stroke will be completed.

The Generic Model of Patient Safety will be used to guide the analysis for the second research question. Data to be synthesised include: environmental, organisational and human factors leading up to and occurring during falls. Following falls, data to be synthesised include: factors minimising or aggravating the outcome, health care outcomes for the patient (e.g. increased length of stay) and consequences for the organisation (e.g. increased cost of care).

## Analysis of subgroups or subsets

None

## Contact details for further information

Rebecca Sullivan

rebecca.sullivan-1@student.uts.edu.au

## Organisational affiliation of the review

University of Technology Sydney

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PROSPERO
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Eastern Health

## Review team members and their organisational affiliations

Mrs Rebecca Sullivan. Eastern Health

Professor Bronwyn Hemsley. University of Technology Sydney

Dr Katherine Harding. Eastern Health

Dr Ian Skinner. University of Technology Sydney

## Type and method of review

Meta-analysis, Systematic review

## Anticipated or actual start date

03 June 2019

## Anticipated completion date

31 December 2019

## Funding sources/sponsors

This research is supported by an Australian Government Research Training Program Scholarship

## Conflicts of interest

## Language

English

## Country

Australia

## Stage of review [1 change]

Review Completed published

## Details of final report/publication(s) or preprints if available [1 change]

Sullivan, R., Harding, K., Skinner, I., Hemsley, B. (2020). Falls in hospital patients with acquired communication disability secondary to stroke: A systematic review and meta-analysis. International Journal of Language & Communication Disorders, 55(6). pp 837-851

https://doi.org/10.1111/1460-6984.12570

## Subject index terms status

NIHR | National Institute for Health Research

PROSPERO
International prospective register of systematic reviews

Subject indexing assigned by CRD

## Subject index terms

Accidental Falls; Communication Disorders; Humans; Inpatients; Stroke

## Date of registration in PROSPERO

13 December 2019

## Date of first submission

02 June 2019

## Details of any existing review of the same topic by the same authors

## Stage of review at time of this submission

| Stage | Started | Completed |
|---|---|---|
| Preliminary searches | Yes | No |
| Piloting of the study selection process | Yes | No |
| Formal screening of search results against eligibility criteria | No | No |
| Data extraction | No | No |
| Risk of bias (quality) assessment | No | No |
| Data analysis | No | No |

*The record owner confirms that the information they have supplied for this submission is accurate and complete and they understand that deliberate provision of inaccurate information or omission of data may be construed as scientific misconduct.*

*The record owner confirms that they will update the status of the review when it is completed and will add publication details in due course.*

## Versions

13 December 2019

27 February 2021