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Sarah D'Souza
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**Investigation of a Communication Enhanced Environment model
after stroke: A mixed methods before-and-after pilot study**

This thesis is presented for the award of
Doctor of Philosophy

Sarah Georgina D'Souza

Bachelor of Speech Pathology (First Class Honours)

Supervisors: Associate Professor Erin Godecke, Professor Natalie Ciccone,
Associate Professor Deborah Hersh, Professor Elizabeth Armstrong, Dr Heidi Janssen

Edith Cowan University
School of Medical and Health Sciences
Western Australia

2021

1

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Declaration

I certify that this thesis does not, to the best of my knowledge and belief: i. incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education; ii. contain any material previously published or written by another person except where due reference is made in the text of this thesis; or iii. contain any defamatory material.

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Abstract

Background: Aphasia is an acquired communication disorder that affects approximately 30% of first ever stroke survivors and persists one-year post-stroke in up to 61% of survivors. Aphasia impacts on all communication modalities with significant negative consequences for social participation, interpersonal relationships, autonomy, capacity to work and quality of life. It is recognised that the environment can influence neural remapping during early stroke recovery. However, patients with aphasia (PWA) following stroke have been observed to spend less than 30% of their day communicating and 44% of their day alone during their first weeks of in-patient rehabilitation. Inadequate opportunities for communication places PWA at risk of developing maladaptive behaviours such as learnt non-use of language. This can negatively impact on aphasia language recovery through lack of language use with adverse consequences for health-related quality of life. An enriched environment (EE) refers to conditions which promote physical, cognitive and social activity and has been shown in animal models of stroke to enhance neuroplasticity, promote better learning and memory, and contribute to significant improvements in motor function. The human equivalent model in an acute and a rehabilitation unit results in patients following stroke spending more time engaged in activity and less time sleeping and alone, however is yet to demonstrate positive effects on clinical outcomes. Aphasia is a complex language impairment and PWA may need support within an EE. This pilot study explores the development, implementation and investigation of an adapted model of an EE, a Communication Enhanced Environment (CEE) model, as a strategy to provide PWA and patients without aphasia (PWOA) greater opportunities to engage in language activities during in-patient rehabilitation early after stroke.

Method: This before-and-after mixed methods pilot study involves one mixed acute and slow stream rehabilitation ward and one rehabilitation ward in a metropolitan private hospital in Perth, Western Australia. A hospital-based CEE model was developed, implemented and investigated. As a basis for implementation of an individual and systems-level behavioural change intervention, the study design aligned with implementation science principles. The study included:

- i. the before phase which involved observation of patients following stroke (the control group; n=7; PWA=3, PWOA=4). Behavioural mapping was completed during the first minute of each five-minute interval over 12 hours (between 7am and 7pm) to

- determine patient engagement in language activities. Semi-structured interviews which incorporated a qualitative description approach were conducted with patients (n=7) to determine factors that were perceived to facilitate or create a barrier for communication. A qualitative description approach was also used throughout focus groups that were conducted with hospital staff and volunteers (n=51) to explore their perceptions of: their knowledge of, skills with, and attitude towards aphasia and communication; opportunities for potentially enhancing communication and language activities for patients; and additional aspects that could be included in the CEE model.
- ii. the implementation phase where the CEE model was developed and embedded in usual care.
 - iii. the after phase which involved repeated data collection with a different cohort of patients (the intervention group; n=7; PWA=4, PWOA=3). The availability of the CEE model was monitored by hospital site investigators (a senior physiotherapist and a speech pathologist). Comparisons of patient engagement in language activity levels were conducted. Patient interviews (n=7) and staff and volunteer focus groups (n=22) were conducted. This was to determine differences following the implementation of the CEE model in: patient experiences of communication; hospital staff knowledge of, skills with, and attitudes towards aphasia and communication; and staff experiences of the implementation and use of the CEE model.

Results: A total of 29 of the 41 (71%) CEE model initiatives were reported to be available to the intervention group. A total of 24 of the 29 (83%) CEE model initiatives were reported to be available for PWA. A total of 5 of the 12 (42%) CEE model initiatives were reported to be available for PWOA. The intervention group engaged in higher, but not significant (CI 95%), levels of language activities (600 of 816 observation time points, 73%) than the control group (551 of 835 observation time points, 66%). Patients described variable experiences accessing different elements of the CEE model, which were influenced by individual patient factors, staff factors, hospital features as well as staff time pressures. Patients who were able to access elements of the CEE model described positive opportunities for their engagement in language activities. Staff perceived the CEE model increased their knowledge of aphasia and developed their skills and confidence in using communication supportive strategies. After the implementation of the CEE model, staff reported embedding communication within usual care tasks and rehabilitation activities, and perceived communication as a shared responsibility within the multidisciplinary

team. There were several unforeseen factors that occurred which may have influenced the implementation and use of the CEE model including: a reduction in stroke admissions at the hospital site; a reduction in nurse-to-patient ratio; a ward reconfiguration; and reduced access to communal dining opportunities. Staff identified a range of factors which influenced the implementation and use of the CEE model. These included: the hospital context; and individual staff, volunteer and patient characteristics; the ease of use for both staff and patients and the implementation approach.

Conclusions: Consideration of implementation science approaches in this pilot study informed the development of a CEE model. This individual and service-level multidisciplinary team intervention was successfully implemented in clinical practice in a mixed acute and slow stream rehabilitation ward and a rehabilitation ward in a private hospital. This study demonstrated that the implementation of a CEE model within this hospital setting was feasible, with patients, staff and volunteers reacting positively to the CEE model overall. The unforeseen contextual challenges that occurred during the study period were beyond the control of the research team and demonstrated the everchanging and challenging nature of the hospital environment. The reduced availability of the CEE model for PWOA requires further attention to determine if the elements of the CEE model could be better applied to meet the needs of this population. Differences between levels of patient language activity before-and-after the implementation of the CEE model did not reach statistical significance. However, some individual increases taken together with the positive feedback suggest that a CEE model has value in enhancing the ward environment for staff and volunteers, the hospital system, and patients following stroke. This study highlights the complex and dynamic nature of the hospital environment which should be considered in future studies investigating individual and hospital service-level interventions such as EE or CEE models. Staff perceptions of factors contributing to the implementation and use of the CEE model provide valuable insights which may inform the implementation approach of future innovative interventions and subsequent development of the CEE model. Results from this study highlight the need to further explore the question of feasibility of a CEE model and patient access to the intervention across multiple ward contexts before we can explore the question of effectiveness. Future iterations of a CEE model should co-designed with patients and their family members.

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Communication access

Enriched environment

Language activity

Implementation science

Recovery

Rehabilitation

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List of Publications included in Thesis

Chapter 5.

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Chapter 6.

D'Souza, S., Godecke, E., Ciccone, N., Hersh, D., Armstrong, E., Tucak, C., & Janssen, H. (2021b). Investigation of the implementation of a Communication Enhanced Environment model in an acute/slow stream rehabilitation and a rehabilitation ward: A before-and-after pilot study. *Clinical Rehabilitation (under second review)*.

Chapter 8.

D'Souza, S., Hersh, D., Godecke, E., Ciccone, N., Janssen, H., & Armstrong, E. (2021c). Patients' Experiences of a Communication Enhanced Environment model in a mixed acute/rehabilitation ward and a rehabilitation ward following stroke: A Qualitative Description Approach. *Disability and Rehabilitation (under second review)*.

Chapter 9.

D'Souza, S., Ciccone, N., Hersh, D., Janssen, H., Armstrong, E., & Godecke, E. (2021d). Staff and volunteer perceptions of a Communication Enhanced Environment model in an acute and a rehabilitation hospital ward: A qualitative description study within a before-and after pilot study. *Disability and Rehabilitation (under initial review)*.

List of Related Publications

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D'Souza, S., Ciccone, N., Janssen, H., Hersh, D., Armstrong, E., & Godecke, E. (2016). "They're staring at the wall": Staff perceptions of barriers and facilitators to communication activity on acute and rehabilitation wards during early stroke recovery. *Cerebrovascular Diseases*, 42(Suppl1).+

D'Souza, S., Ciccone, N., Janssen, H., Hersh, D., Armstrong, E., & Godecke, E. (2015). Communication enhanced environments to increase communication activity early after stroke: Design and protocol [Abstract]. *International Journal of Stroke*, 10(3), 59.+

*Platform presentation

+Poster presentation

Conference Platform Presentations

D'Souza, S., Ciccone, N., Janssen, H., Hersh, D., Armstrong, E., & Godecke, E. (2016, May 15-18).

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D'Souza, S., Janssen, H., Ciccone, N., Hersh, D., Tucak, C., Gallan-Dwyer, M., Armstrong, E., & Godecke, E. (2017, August 23-25). *Investigating Communication Enhanced Environments to increase communication activity early after stroke*. 27th Annual Scientific Meeting of the Stroke Society of Australasia. Queenstown, New Zealand.

D'Souza, S., Janssen, H., Ciccone, N., Hersh, D., Tucak, C., Gallan-Dwyer, M., Armstrong, E., & Godecke, E. (2017, December). *Stroke in-patient activity early after stroke: Individual and environmental barriers and facilitators to communication*. [conference platform presentation]. Edith Cowan University Speech Pathology Research Symposium. Perth, Australia.

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Table of Contents

| | | |
|------------|--|----|
| | Use of Thesis..... | 2 |
| Chapter 1. | Thesis Overview..... | 28 |
| 1.1 | The Role of the Environment in Aphasia Recovery..... | 28 |
| 1.2 | Implementation Science..... | 29 |
| 1.3 | Significance of Research..... | 29 |
| 1.4 | Aims..... | 29 |
| 1.5 | Thesis Outline..... | 30 |
| Chapter 2. | Introduction..... | 33 |
| 2.1 | Neuroplasticity..... | 33 |
| 2.2 | The Role of the Environment in Stroke Recovery..... | 38 |
| 2.3 | Environmental Interventions: Enriched Environments..... | 42 |
| 2.4 | Environmental Interventions in Aphasia and Communication Management..... | 45 |
| 2.5 | Summary..... | 52 |
| Chapter 3. | Implementation Science Theoretical Framework..... | 54 |
| 3.1 | The Evidence to Practice Gap..... | 54 |
| 3.2 | Implementation Science..... | 55 |
| 3.3 | The Knowledge-to-Action Framework..... | 56 |
| 3.4 | The COM-B model: Capability, Opportunity and Motivation..... | 58 |
| 3.5 | Behaviour Change Taxonomy..... | 58 |
| 3.6 | Summary..... | 59 |
| Chapter 4. | Methodological Framework..... | 60 |
| 4.1 | Study Design..... | 60 |
| 4.2 | Setting..... | 61 |
| 4.3 | Participants..... | 61 |
| 4.4 | Study Assessments and Procedures..... | 63 |
| 4.5 | Data Analysis..... | 66 |
| 4.6 | Qualitative Rigour..... | 67 |
| 4.7 | Data Management..... | 69 |
| 4.8 | Administration Procedures..... | 70 |
| Chapter 5. | Control Group and Staff Qualitative Data..... | 73 |

| | | |
|------------|---|-----|
| 5.1 | Background..... | 75 |
| 5.2 | Method..... | 76 |
| 5.3 | Results..... | 82 |
| 5.4 | Discussion..... | 90 |
| 5.5 | Conclusion..... | 93 |
| 5.6 | Acknowledgements..... | 94 |
| 5.7 | Competing Interests Statement..... | 94 |
| 5.8 | Funding Statement..... | 94 |
| 5.9 | Data Sharing Statement..... | 95 |
| Chapter 6. | Research Questions i. and ii. Results: Control and Intervention Group | |
| | Quantitative Data..... | 103 |
| 6.1 | Introduction..... | 104 |
| 6.2 | Method..... | 105 |
| 6.3 | Development of the CEE model..... | 108 |
| 6.4 | The CEE model..... | 109 |
| 6.5 | Implementation of the CEE model..... | 110 |
| 6.6 | Sample Size and Statistical Analyses..... | 110 |
| 6.7 | Results..... | 111 |
| 6.8 | Availability of the CEE model..... | 115 |
| 6.9 | Time Spent Engaging in Language Activities..... | 117 |
| 6.10 | Post Hoc Analysis..... | 117 |
| 6.11 | Discussion..... | 118 |
| 6.12 | Clinical Message..... | 122 |
| 6.13 | Acknowledgements..... | 122 |
| 6.14 | Funding..... | 123 |
| 6.15 | Declaration of Conflicting Interests..... | 123 |
| 6.16 | Reporting Guidelines..... | 123 |
| Chapter 7. | Additional Results..... | 147 |
| 7.1 | Control and Intervention Group Quantitative Post Hoc Analyses..... | 147 |
| 7.2 | CEE model and Aphasia Communication Partner Training Staff and Volunteer Survey Results..... | 154 |
| 7.3 | Summary..... | 161 |

| | | |
|-------------|---|-----|
| Chapter 8. | Intervention Group Qualitative Data..... | 167 |
| 8.1 | Introduction..... | 169 |
| 8.2 | Method..... | 171 |
| 8.3 | Intervention..... | 174 |
| 8.4 | Interviewer Characteristics..... | 178 |
| 8.5 | Data Collection Methods..... | 178 |
| 8.6 | Data Analysis..... | 179 |
| 8.7 | Results..... | 180 |
| 8.8 | Discussion..... | 186 |
| 8.9 | Strengths and Limitations..... | 189 |
| 8.10 | Conclusion..... | 190 |
| Chapter 9. | Research Question v. Results: After Phase Staff and Volunteer Qualitative Data..... | 196 |
| 9.1 | Introduction..... | 198 |
| 9.2 | Method..... | 200 |
| 9.3 | The CEE model..... | 201 |
| 9.4 | Implementation of the CEE model..... | 205 |
| 9.5 | Participants..... | 206 |
| 9.6 | Interviewer Characteristics..... | 206 |
| 9.7 | Data Collection Methods..... | 207 |
| 9.8 | Quality and Validity..... | 208 |
| 9.9 | Results..... | 209 |
| 9.10 | Discussion..... | 223 |
| 9.11 | Conclusion..... | 227 |
| 9.12 | Strengths and Limitations..... | 228 |
| 9.13 | Acknowledgements..... | 228 |
| 9.14 | Disclosure of Interest..... | 228 |
| Chapter 10. | Research Questions iii. and iv. Results: Comparisons of Before-and-After Phases..... | 233 |
| 10.1 | Patient Experiences Before-and-After the Implementation of the CEE model.. | 233 |
| 10.2 | Summary: Comparisons of Control and Intervention Groups' Experiences..... | 239 |

| | | |
|-------------|---|-----|
| 10.3 | Differences in Staff Knowledge of, Skills with, and Attitudes towards Communication and Aphasia following the Implementation of a CEE model. | 241 |
| 10.4 | Summary: Comparisons of Staff Knowledge of, Skills with, and Attitudes towards Communication and Aphasia Before-and-After Implementing the CEE model..... | 246 |
| Chapter 11. | Discussion..... | 249 |
| 11.1 | Summary of Aims..... | 249 |
| 11.2 | What are the Lessons Learnt?..... | 255 |
| 11.3 | Potential Benefits of a CEE model..... | 259 |
| 11.4 | Limitations and Future Directions..... | 261 |
| 11.5 | Conclusion..... | 264 |
| Chapter 12. | References..... | 266 |

List of Tables

| | |
|---|-----|
| Table 1. Chapter 4, Staff Participants in the Before-and-After Phases | 61 |
| Table 2. Chapter 5, Staff Participants | 78 |
| Table 3. Chapter 5, Patient Details and Demographics | 80 |
| Table 4. Chapter 6, Ward Layout, Bedding Configuration, Staff Levels and Stroke Admissions during the Study Period | 113 |
| Table 5. Chapter 6, Participant Details and Demographics | 114 |
| Table 6. Chapter 6, Availability of the CEE model Initiatives | 116 |
| Table 7. Chapter 6, Group Totals for the Availability of the CEE model Initiatives | 116 |
| Table 8. Chapter 6, Mean, Standard Deviation and One-way ANOVA results of Language Activities | 117 |
| Table 9. Chapter 7, Demographics of Survey Respondents | 160 |
| Table 10. Chapter 7, Mean Scores on the Likert Scale Statements Grouped by Occupation | 155 |
| Table 11. Chapter 8, Participant Demographics | 173 |
| Table 12. Chapter 8, The CEE model Initiatives and Participant Involvement in each Initiative | 175 |
| Table 13. Chapter 8, Patient Interview Guide | 179 |
| Table 14. Chapter 9, Staff and Volunteer Participant Numbers | 206 |
| Table 15. Chapter 9, Focus Group and Interview Guide | 208 |

List of Figures

| | |
|---|-----|
| Figure 1. Chapter 3, Knowledge-to-Action Framework..... | 57 |
| Figure 2. Chapter 5, Summary of Patient Screening and Recruitment | 79 |
| Figure 3. Chapter 5, Summary of Themes and Sub-themes of Staff and Patient Perceptions to Barriers and Facilitators to Patient Communication in Hospital | 82 |
| Figure 4. Chapter 6, Flow of Study Participants..... | 112 |
| Figure 5. Chapter 7, Proportion of Behaviour Mapping Timepoints Control Group (PWA and PWOA) and Intervention Group (PWA and PWOA) were engaged in Language Activities | 148 |
| Figure 6. Chapter 7, Proportion of Behaviour Mapping Timepoints Control Group (PWA and PWOA) and Intervention Group (PWA and PWOA) were engaged in Solitary Language Activities..... | 149 |
| Figure 7. Chapter 7, Proportion of Behaviour Mapping Timepoints Control Group (PWA and PWOA) and Intervention Group (PWA and PWOA) were engaged in Interactive Language Activities | 150 |
| Figure 8. Chapter 7, Proportion of Behaviour Mapping Timepoints Control Group and Intervention Group Patients Watched Television (Separating Watching Television from Solitary Language Activities) | 152 |
| Figure 9. Chapter 7, Patients' Level of Mobility and Average Proportion of Observation Timepoints Watching Television | 152 |
| Figure 10. Chapter 7, Proportion of Behaviour Mapping Timepoints Watching Television and Control and Intervention Group Mobility Levels..... | 153 |
| Figure 11. Chapter 8, Visual Representation of Themes and Sub-themes..... | 180 |
| Figure 12. Chapter 9, Visual Representation of Themes and Sub-themes..... | 210 |

List of Appendices

| | |
|---|-----|
| Appendix A. Chapter 5, Consolidated criteria for reporting qualitative studies: 32-item checklist | 96 |
| Appendix B. Chapter 5, Before phase staff focus group guide | 100 |
| Appendix C. Chapter 5, Control group patient interview guide | 101 |
| Appendix D. Chapter 6, Implementation science elements incorporated in the study design aligned with implementation science principles: KTA framework, COM-B model and behaviour change taxonomy..... | 124 |
| Appendix E. Chapter 6, Behaviour mapping tool | 127 |
| Appendix F. Chapter 6, The Communication Enhanced Environment model | 128 |
| Appendix G. Chapter 6, The GUIDED statement for reporting for intervention development studies..... | 139 |
| Appendix H. Chapter 6, the CONSORT 2010 checklist for a pilot or feasibility trials..... | 141 |
| Appendix I. Chapter 6, The TIDieR checklist | 145 |
| Appendix J. Chapter 7, Staff communication partner training post-training questionnaire..... | 163 |
| Appendix K. Chapter 8, The consolidated criteria for reporting qualitative studies: 32 item checklist | 191 |
| Appendix L. Chapter 9, The consolidated criteria for reporting qualitative studies: 32 item checklist | 229 |

List of Abbreviations and Definitions of Terms

| | |
|----------------------------------|--|
| ACA: | Anterior cerebral artery |
| AcuteN: | Acute nurse |
| CEE model: | Communication Enhanced Environment model, an adapted model of an enriched environment. An environment that provides patients following stroke opportunities to engage in language activities during in-patient rehabilitation. |
| CNM: | Clinical nurse manager |
| COM-B model: | A behaviour change framework which incorporates three inter-related components: capability (C); opportunity (O); and motivation (M), that are believed to generate a targeted behaviour (B). |
| CONSORT 2010: | Consolidated Standards of Reporting Trials (CONSORT): 26-item checklist reporting statement for interventions. |
| COREQ: | Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist reporting statement for qualitative studies. |
| D: | Days |
| DT: | Dietitian |
| EE model: | Enriched environment model. An environment that promotes physical, cognitive and social activity. |
| GUIDED: | Guidance for reporting intervention development studies in health research (GUIDED): 14-item checklist reporting statement for intervention development studies. |
| Interactive language activities: | Activities which are based in communicative interactions that involve an exchange of information with a communication partner involving talking, gesture and/or facial expression, reading, writing or drawing to communicate. |
| KTA framework: | The Knowledge-to-Action framework to understand the process of implementing evidence in clinical practice. |
| L: | Left hemisphere |
| Language activities: | Language tasks that consist of solitary or interactive language activities. |
| MCA: | Middle cerebral artery |
| MDT: | Multidisciplinary team |

| | |
|---|---|
| MedC: | Medical consultants |
| MoCA: | Montreal Cognitive Assessment |
| N: | Number in total sample |
| n: | Number in sub-sample |
| NIHSS: | National Institute of Health Stroke Scale |
| N/P: | Not provided |
| Nur: | Nurse |
| Nurse stu: | Nursing student |
| OT: | Occupational therapists |
| OTA: | Occupational therapy assistant |
| OTM: | Occupational therapy manager |
| PCA: | Patient care assistant |
| PT: | Physiotherapist |
| PTA: | Physiotherapy assistant |
| PWA: | Person or patient with aphasia |
| PWOA: | Person or patient without aphasia |
| R: | Right hemisphere |
| RehabN: | Rehabilitation nurse |
| SD: | Standard deviation |
| Solitary language activities: A functional or non-functional/non-propositional language task which could be completed alone such as reading, writing, listening to the radio, singing or using language apps on a tablet. | |
| SP: | Speech pathologist |
| SPA: | Speech Pathology assistant |
| SPM: | Speech Pathology manager |
| SW: | Social worker |
| TA: | Acute ward therapy assistant |
| TIDieR: | Template for Intervention Description and Replication (TIDieR): 12-item checklist reporting statement for intervention description and replication. |
| V: | Volunteer |
| VM: | Volunteer manager |
| WAB-R AQ: | Western Aphasia Battery-Revised Aphasia Quotient score |

Chapter 1. Thesis Overview

1.1 The Role of the Environment in Aphasia Recovery

It is widely recognised that the environment can influence recovery after stroke. However, the current hospital environment may reflect what is considered impoverished (Ana°ker et al., 2019; King et al., 2011; Maben et al., 2016; McDonald et al., 2018; Persson et al., 2015; Rosbergen et al., 2017a; Shannon et al., 2018; Singh et al., 2016; West & Bernhardt, 2012), with patients following stroke spending large proportions of their day alone, inactive (Janssen et al., 2014a) and feeling bored and lonely (Kenah et al., 2018). Patients with aphasia (PWA) following stroke may be further disadvantaged in hospital with health staff who frequently limit or avoid interactions with them. This is often the result of being time poor or lacking the knowledge and skills in using communication supportive strategies (Ball et al., 2014; Burns et al., 2015; Carragher et al., 2020). A lack of opportunity to engage in language use and social activities may have significant negative consequences for: aphasia recovery and communication access within the hospital system; and patients' mood, engagement in stroke rehabilitation and health-related quality of life.

An enriched environment (EE) involves the provision of a challenging and stimulating environment which facilitates voluntary engagement in physical, cognitive and social activity (Nithianantharajah & Hannan, 2006). EE has been demonstrated to enhance learning and memory, promote some elements of neuroplasticity, and support neural recovery in animal stroke models (McDonald et al., 2018). Pilot studies investigating the human equivalent EE model found that patients exposed to EE on acute and rehabilitation stroke wards were significantly more likely to be engaged in activity than patients in an equivalent non-enriched ward (Janssen et al., 2014b; Rosbergen et al., 2017a). However, translation to improved functional stroke outcomes is yet to be demonstrated (Janssen et al., 2021).

To date, there has been limited focus on language within an EE. A Communication Enhanced Environment (CEE) model is an adapted model of EE which considers the complexities and communication needs of PWA within the hospital environment. There is a need to build on the framework of EE in order to develop a CEE model, drawing on research from communication access, social approaches to communication, and communication partner training.

1.2 Implementation Science

Research evidence does not automatically translate into evidence-based practice with estimations indicating that up to 50% of research findings are successfully translated into clinical practice (Balas & Boren, 2000). Additionally, the process of translating research evidence into clinical practice is reported to take at least 17 years (Balas & Boren, 2000). Implementation science aims to provide a framework to approach the translation of research to address the evidence to practice gap (Lynch et al., 2018a). This is achieved through the design of the intervention and the evaluation of the uptake of research into practice (Lynch et al., 2018a). The principles of implementation science and theories of behaviour change guided the design of this study and the approach adopted for the development and implementation of the CEE model. This was to maximise the usability and acceptability of the model to facilitate individual, ward and system-level change by creating an intervention that aimed to be pragmatic, accessible and easy to use.

1.3 Significance of Research

As a fundamental feature of human interaction, enhanced language activity during stroke recovery has the potential to: augment neuroplasticity processes; promote communication exchange between patients and health staff; and promote opportunities for engagement in meaningful activities and social interactions. This will likely: mitigate boredom; promote patient mood, well-being and engagement in rehabilitation; promote patient-centred care and communication access; and promote aphasia language recovery. Effective and efficient nurse-patient communication as a result of nurse training has been found to save time, reduce frustration and reduce the burden associated with caring for PWA (McGilton et al., 2009). Improved staff-patient communication may also result in more accurate patient diagnoses, care and treatment, better patient outcomes and improved professional-patient relationships (Legg et al., 2005; McCabe, 2004; McGilton et al., 2009; Hersh et al., 2016; Street et al., 2009).

1.4 Aims

This mixed-methods before-and-after pilot study aimed to develop, implement and investigate a CEE model in an acute and a rehabilitation hospital ward. The following research questions were explored:

- i. Can a CEE model be implemented in a hospital ward setting?
- ii. Does a CEE model influence the amount of time patients following stroke spend engaging in language activities?
- iii. What are the differences in patients' experiences of communication in a CEE model compared to patients' experiences of communication in a usual care ward environment?
- iv. Following the implementation of a CEE model, is there a difference in how staff perceive their knowledge of, skills with, and attitudes towards communication and aphasia?
- v. What is the experience of implementing a CEE model for staff working with patients following stroke within an acute and a rehabilitation ward?

1.5 Thesis Outline

This thesis is divided into 11 chapters including four chapters that are presented as articles for publication. These four chapters have been written in the journal format. However, for ease of reading this thesis, the tables, figures, referencing and general formatting are continuous throughout. Abbreviations are redefined in each chapter. Appendices are at the end of each chapter to aid the readability of this thesis. The page numbers in each publications' reporting guidelines were amended to align with the formatting of this thesis.

Chapter 1: Thesis Overview

Chapter 1 provides a brief background of the role of the environment in aphasia recovery, implementation science, the aims of this research and the outline of the thesis chapters.

Chapter 2: Introduction

Chapter 2 provides a general review of the literature and key concepts for this thesis. Focussed literature reviews are also provided at the beginning of each publication.

Chapter 3: Implementation Science Overview

Chapter 3 provides a broad description of implementation science, as well as introduces specific implementation science frameworks and concepts from behaviour change research that informed the design of this study.

Chapter 4: Methodological Framework

Chapter 4 provides an overview of the methodological framework of this study.

Chapter 5: Control Group and Staff Qualitative Data

Chapter 5 is a published article that reports on the qualitative component of the before phase of this study which explored hospital staff, volunteers' and patients' perspectives of barriers and facilitators to communication and engagement in language activity within the usual care ward environment.

Chapter 6: Research Questions i. and ii. Results: Control and Intervention Group

Quantitative Data

Chapter 6 is a publication (under second review) that reports on the availability of the CEE model. This chapter also reports the control group and intervention groups' level of engagement in language activities before-and-after the implementation of the model in usual care. This publication also details how implementation science principles informed the study design. This includes the behaviour change taxonomy which informed the strategies used to promote the implementation and uptake of the CEE model in usual care. This chapter addresses research questions i. 'can a CEE model be implemented in a hospital ward setting?' and ii. 'does a CEE model influence the amount of time patients following stroke spend engaging in language activities?'

Chapter 7: Additional Results

Chapter 7 provides additional results involving control and intervention group quantitative post-hoc analyses, and staff and volunteer qualitative feedback for the CEE model and aphasia communication partner training sessions. The quantitative post-hoc analyses explored: the influence of aphasia on patient language activity levels; differences between the patient groups' engagement in solitary and interactive language activities; and the proportion of time patients spent watching television before-and-after implementing the CEE model in relation to their mobility status. The staff and volunteer post-training survey explores feedback on the CEE model and aphasia communication partner training sessions to inform the future development of the CEE model.

Chapter 8: Intervention Group Qualitative Data

Chapter 8 is a publication (under second review) that reports the qualitative results from the intervention group following the implementation of the CEE model in the ward environment. This chapter explores patients' perceptions of communication interactions and language activity during their hospital admission with the CEE model implemented in usual care.

Chapter 9: Research Question v. Results: After Phase Staff and Volunteer Qualitative Data

Chapter 9 is a publication (under initial review) that reports the qualitative component from the after phase investigating staff and volunteers' perceptions of their knowledge and attitudes towards communication and aphasia, and their perceptions of their skills in interacting with PWA following the implementation of a CEE model in the ward environment. This chapter addresses research question v. 'what is the experience of implementing a CEE model for staff working with patients following stroke within an acute and a rehabilitation wards?'.

Chapter 10: Research Questions iii. and iv. Results: Comparison of Before-and-After Phases

Chapter 10 provides a comparison of control group and intervention group patients' and before-and-after phase staff qualitative data. This addresses research questions iii. 'what are the differences in patients' experiences of communication in a CEE model compared to patients' experiences of communication in a usual care ward environment?', and iv. 'following the implementation of a CEE model, is there a difference in how staff perceive their knowledge of, skills with, and attitudes towards communication and aphasia?'.

Chapter 11: Discussion

Chapter 11 provides a final discussion bringing together the key findings of this thesis and discusses the lessons learnt in the implementation of the CEE model, the potential benefits of a CEE model, study limitations, future directions of this research, and final conclusions.

Chapter 2. Introduction

This chapter provides a summary of the literature underpinning this study. This includes an exploration of the following concepts: neuroplasticity as it relates to normal learning and recovery following stroke; the role of the environment in animal and human recovery following stroke; the role of the environment in aphasia language recovery; enriched environments (EE) in recovery following stroke; and environmental based interventions in aphasia management following stroke.

2.1 Neuroplasticity

Neuroplasticity describes the process whereby neurons in the brain alter their structure and function in response to stimuli and experiences in the environment (Kleim & Jones, 2008; Kolb & Tesky, 2010). Neuroplasticity occurs as a normal process of learning and also enables the brain to regain function following injury, including stroke (Chang, 2014; Kleim & Jones, 2008; Kolb & Tesky, 2010; Maier et al., 2019).

2.1.1 Neuroplasticity in Normal Adult Learning

Studies on in vivo imaging suggest neuroplasticity processes in normal learning occur in areas of the brain involved in the development of specific skills required for activities such as sport or playing musical instruments (Chang, 2014). Professional rugby players demonstrate increased neural activation in response to visuospatial stimuli compared to novices (Sekiguchi et al., 2011). For example, professional keyboard players, when compared to novice keyboard players, demonstrate an enlarged left motor area (Bangert & Schlaug, 2006). Structural differences in the brain are also seen when comparing string music players to keyboard players (Bangert & Schlaug, 2006). This is hypothesised to be the result of differences in the dominant hand required to play the instrument (Bangert & Schlaug, 2006). It has been suggested that task specificity correlates with neuroplasticity processes in normal learning (Groussard et al., 2014). Significant correlations have been found between the duration of musical practice and changes in the size of areas in the brain associated with musical training (Groussard et al., 2014). Additionally, some neural changes were only seen in musicians who had 15 or more years of musical practice experience suggesting the number of repetitions of an activity influences neuroplasticity processes in normal learning (Groussard et al., 2014).

2.1.2 Neuroplasticity in Stroke Recovery

In order to understand the process of neuroplasticity in recovery after stroke, mechanisms surrounding cell death need to be explored. Stroke results in a disruption in the blood supply to neurons (Şekerdağ et al., 2018). This causes a cascade of pathophysiological responses that ultimately lead to cell death (Şekerdağ et al., 2018). Oedema at the cellular level occurs both in the area of infarct and the penumbra (the area immediately surrounding the infarct) causing a reduction in electrical activity in these areas (Carmichael et al., 2004). Areas in the brain that are not located near the infarct, but are associated by neural function, also experience a loss of electrical activity (diaschisis) (Bowden et al., 2014; Carmichael et al., 2004). If reperfusion (restoration of blood flow) occurs, the penumbra and the other areas associated in function regain electrical activity (Carmichael et al., 2004). Neural recovery is thought to occur through reversal of diaschisis, cell genesis (formation of new neurons) and repair, altering existing neural pathways, and the creation of new neural pathways in the brain (Bowden et al., 2014). This process of cortical remapping after stroke is activity dependent as neural circuits compete for healthy tissue (Murphy & Corbett, 2009).

There are a number of principles of neuroplasticity considered to be involved in neurological recovery after stroke. These principles have been predominantly informed by animal stroke models (Cramer et al., 2011; Crosson et al., 2019; Raymer et al., 2008) with emerging research supporting these principles in human motor recovery (Maier et al., 2019). The principles of neuroplasticity have evolved as research grows in this area (Maier et al., 2019). ‘Use it or lose it’ describes the process whereby functional inactivity results in the degradation of the associated neural circuits (Kleim & Jones, 2008). ‘Use it and improve it’ describes the process whereby neuroplasticity can be induced through targeted rehabilitation activities, resulting in improved function and neural re-mapping in preserved areas of the brain post-stroke (Kleim & Jones, 2008). ‘Specificity’ or ‘task specific practice’ suggests that activity-driven neurological rehabilitation after stroke needs to target the specific skilled task that therapy is aiming to rehabilitate (Maier et al., 2019). ‘Repetition’, ‘massed practice’ or ‘repetitive practice’ suggests that repetition of a learnt behaviour over a prolonged period of time is required for neural re-mapping (Maier et al., 2019). ‘Spaced practice’ or ‘distributed practice’ suggests there needs to be rest periods between learning episodes within the repetitive practice schedule, however this is considered an emerging concept within this area, with limited research investigating this principle in post-stroke recovery (Maier et al., 2019). Additionally, parameters surrounding

optimal rehabilitation distributed practice schedules or intensive regimens are currently unknown. The terms 'intensity' or 'dosage' are often used interchangeably, and relate to the number of hours, frequency of rehabilitation sessions, the duration of the sessions and the number of targeted repetitions within the rehabilitation session. It is suggested that these can influence neuroplasticity processes, with evidence in motor recovery suggesting that higher intensity results in better outcomes post-stroke (Maier et al., 2019). However, the number of hours, number of targeted repetitions within a rehabilitation session and the frequency of sessions required for optimal outcomes in human motor recovery following stroke are not yet known (Maier et al., 2019). 'Variable practice' suggests that variability within the rehabilitation activity or randomising the presentation of individual rehabilitation activities promotes the retention and enhances generalisation to non-trained tasks (Maier et al., 2019). 'Task difficulty' describes increasing the difficulty of rehabilitation activities and training challenging tasks that are personalised to an individual's capability (Maier et al., 2019). This is thought to lead to superior outcomes when compared to rehabilitation tasks with fixed difficulty levels (Maier et al., 2019). 'Explicit feedback' on performance is considered to speed up motor learning and promote long-term retention of learnt activities (Maier et al., 2019). The 'timing' of rehabilitation is considered to be important, where commencing rehabilitation early after stroke potentially optimises neuroplasticity and facilitates the restoration of damaged neural pathways (Murphy & Corbett, 2009). In animal stroke models, delayed rehabilitation following stroke (commenced >1-month post-stroke) results in poorer outcomes in comparison to early rehabilitation (commenced <14 days post-stroke) (Murphy & Corbett, 2009). This is also supported by research that suggests there is a limited, time dependent period after stroke where the increased expression of genes and proteins involved in neural development may facilitate neural remapping (Kleim, 2011; Kolb & Tesky, 2010; Meyer, et al., 2010; Murphy & Corbett, 2009). 'Salience' relates to the importance associated with the rehabilitation activity by the individual completing the task. For example, the level of motivation or the perceived reward associated with a task may facilitate neural re-mapping (Kleim & Jones, 2008). 'Transference' or 'generalisability' suggests that neural changes due to task specific training can promote concurrent or subsequent neuroplasticity processes and performance in generalised contexts. 'Interference' refers to maladaptive neuroplasticity processes, such as remapping of compensatory behaviours (Kleim & Jones, 2008) which occurs when compensatory strategies are favoured over rehabilitative behaviours in order to regain function (Murphy & Corbett, 2009).

The allocation of neural resources and re-mapping to maladaptive behaviours can impact on neural recovery aiming to regain lost function (Kleim & Jones, 2008) which may lead to a further reduction of function beyond the initial impairment (Murphy & Corbett, 2009).

2.1.3 Neuroplasticity and Aphasia Language Recovery

There has been less of a focus in the literature on the mechanisms of post-stroke cognitive and language recovery (Cramer et al., 2011; Kiran & Thompson, 2019; Raymer et al., 2008; Wilson & Schneck, 2020). In post-stroke recovery of cognitive and language function, research suggests that dosage, intensity, timing, and specificity are important factors however the optimal circumstances required to promote recovery of cognitive functions after stroke are not yet known (Cramer et al., 2011; Raymer et al., 2008).

Impairment-based aphasia therapy leads to language reorganisation in the brain (Kiran & Thompson, 2019; Wilson & Schneck, 2020). Studies show that language rehabilitation results in increased activation in the penumbra of the left-brain hemisphere and surrounding areas, and in the contralateral right hemisphere (Kiran & Thompson, 2019; Wilson & Schneck, 2020). This supports the neuroplasticity principle of using language to improve it during post-stroke aphasia recovery (Kiran & Thompson, 2019). In general, studies in aphasia recovery suggest treatment that targets specific language domains may result in the best outcomes, supporting the principle of task specificity (Kiran & Thompson, 2019; Wilson & Schneck, 2020).

Brogan et al., (2020) recently completed a study investigating early aphasia therapy dosage. Results from this study support the neuroplasticity principles of task specificity and repetition as contributing factors for language recovery after stroke. This study found an improved score on the Western Aphasia Battery-Revised Aphasia Quotient (WAB-R AQ, Kertesz, 2006) score at six months post-stroke was predicted by the total number of verbal utterances produced by people with aphasia and the number of cues used with success by the treating speech pathologist. Therefore, repetition and specificity were identified as potential active key ingredients promoting aphasia neuroplasticity processes.

Results from a recent aphasia research trial suggests the mechanisms of language recovery early after stroke may require a different theoretical approach to motor recovery when considering therapy intensity (Godecke et al., 2020). VERSE was the largest randomised controlled trial investigating intensive early aphasia therapy (within the first 40 days post-stroke). This trial found that over four weeks, intensive aphasia therapy provided for an average of five

hours per week, demonstrated no additional benefit to therapy provided for an average of 2.3 hours per week (Godecke et al., 2020). This reflects a somewhat less intensive therapy schedule during the early recovery period than previous research had suggested (Brady et al., 2016). These outcomes are thought to suggest that early post-stroke aphasia recovery may not benefit from the levels of intensity that are seen to benefit motor recovery (Godecke et al., 2020). It has been hypothesised that distributed learning schedules observed to benefit cognitive learning in healthy adults, may be more relevant for post-stroke aphasia language recovery than intense, massed practice (Dignam et al., 2016; Godecke et al., 2020). Early work investigating distributed learning schedules in healthy adult populations has demonstrated that this approach facilitates the long-term retention of learnt nonsense words (Dignam et al., 2016). Gaps between learning timepoints are thought to facilitate retention of information and provide opportunities to practise learnt skills outside the learning session (Dignam et al., 2016). It is also hypothesised that these gaps between learning timepoints increase the number of different contexts the learnt information can be encoded, which increases the number of retrieval pathways and therefore facilitates performance (Dignam et al., 2016). Additionally, massed practice during intensive cognitive tasks is thought to reduce an individual's ability to maintain attention to the task, which may negatively affect cognitive learning (Dignam et al., 2016). This suggests that a less intensive, distributed aphasia therapy schedule, with opportunities for language use within a variety of contexts outside of therapy (transference), may be a factor that facilitates aphasia recovery early after stroke.

A recent meta-analysis analysing over 5 000 individual data points found that optimal aphasia language outcomes are observed when therapy is administered within the early phase after stroke (<1-month post-stroke) compared to therapy commenced in the chronic phase (>6-months post-stroke) (Brady et al., in press). Within the VERSE trial, Godecke et al. (2020) found aphasia therapy provided within three months post-stroke (commenced in the early phase post-stroke) resulted in improvements greater than 25 points on the WAB-R AQ score (Kertesz, 2006) across all treatment groups. This is well above the 5-6 points on the WAB- R AQ score (Kertesz, 2006) which is considered a clinically significant improvement (Gilmore et al., 2018). Post-hoc effect size comparisons of spontaneous recovery ($d = 0.65$) in a historical control cohort (Robey, 1994) and results in the VERSE trial indicate over double the effect size ($d = 1.64$) in those whose therapy was commenced within the first two weeks post-stroke when measured at six-months post-stroke (Godecke et al., 2020). This suggests that timing of aphasia therapy is an important

contributing factor to language recovery post-stroke, more specifically, that treatment commenced in the early phase post-stroke results in better outcomes than treatment commenced in the chronic phase post-stroke.

2.2 The Role of the Environment in Stroke Recovery

It is recognised that the environment influences health, well-being, brain structure and neural recovery following stroke (Kolb & Tesky, 2010). As a result, there has been increased focus on the role of the environment in stroke recovery in both animal and human stroke research.

2.2.1 *The Environment in Animal Models of Stroke Recovery*

Animals exposed to deprived and isolated environments following stroke are observed to have a reduced number of synapses and dendritic spines in comparison to those placed in socially, physically and cognitively enriched housing conditions (Johansson, 2003). Additionally, social restraints have negative effects on neurological and behavioural recovery (Craft et al., 2005; Karelina et al., 2009). Studies have examined the effects of the presence or absence of social interaction on stroke lesion size, weak limb use, and stress levels (as measured by concentrations of hormones and proteins in blood samples) in rodents following stroke (Craft et al., 2005; Karelina et al., 2009). Rodents housed with a healthy companion had significant reductions in the size of their infarct and stress levels, and greater increases in their use of their impaired limb, in comparison to those that were isolated during early stroke recovery (Craft et al., 2005; Karelina et al., 2009). Additionally, Karelina et al., (2009) investigated mice who were housed in cages separated by a partition where they could hear, see and smell their companion but were unable to socially interact with them. These mice demonstrated infarct sizes similar to mice that were completely socially isolated. These results suggest that social interactions may influence neural and functional recovery in animal models of stroke.

2.2.2 *The Environment in Human Stroke Recovery*

The World Health Organization International Classification of Functioning, Disability and Health (World Health Organization, 2001) defines the consumer environment as encompassing: social and physical immediate surrounds; and the broader environment, including formal and informal systems: the health care setting; and the skills, values and attitudes of health care

providers; services, systems and policies. Therefore, environmental factors that occur at an individual and systems' level, have the potential to influence health outcomes. For the purposes of this study, during early stroke recovery, the environment includes: the physical hospital environment; resources and equipment; people within the environment; hospital policies and procedures; and the social, cultural and attitudinal environment.

The hospital environment during stroke recovery may reflect what is considered impoverished (Ana°ker et al., 2019; Janssen et al., 2014a; Kenah et al., 2018; King et al., 2011; Maben et al., 2016; McDonald et al., 2018; Persson et al., 2015; Rosbergen et al., 2017a; Shannon et al., 2018; Singh et al., 2016; West & Bernhardt, 2012). An observational study of patients following stroke in the acute hospital setting found that patients spent an average of 29.3% of their day engaged in social activity, and 44.7% of their day engaged in cognitive activity (Rosbergen et al., 2017a). In another study of patients following stroke in the rehabilitation hospital setting, they spent an average of 51% inactive and 54% alone (Janssen et al., 2014a). Additionally, patients were observed to spend an average of 32% of their day engaged in social activity, and only 4% engaged in cognitive activity (Janssen et al., 2014a). Within the rehabilitation setting, the amount of time patients spent engaged in cognitive and social activity was not observed to increase despite improvements in their functional independence over their admission (Janssen et al., 2014a).

Patients have been observed to engage in the majority of their activity at their bedside during in-patient rehabilitation (Janssen et al., 2014a). This is likely to be reinforced by hospital procedures and culture which encourage staff to return patients to their rooms after therapy (Janssen et al., 2014a; Kenah et al., 2018). Patients have reported they often sit at their bedside waiting for something to happen, feeling bored and inactive for a large proportion of the day (Kenah et al., 2018). Functional impairments are common after stroke and may limit patients' ability to initiate activities in their room (Kenah et al., 2018). Additionally, an increased shift towards single bedded hospital rooms to promote privacy and infection control has been noted (Ana°ker et al., 2017; Shannon et al., 2018). However, patients admitted to single bedded rooms spent more time alone and inactive, and engaged in fewer interactions compared to those in multi-bedded rooms (Ana°ker et al., 2017). Despite the perceived benefits of increased infection control and privacy for hospitalised patients in single rooms, patients have reported increased feelings of loneliness and social isolation in single bedded rooms compared to multi-bedded

rooms (Ana°ker et al., 2019; Maben et al., 2016; Persson et al., 2015; Shannon et al., 2018; Singh et al., 2016).

The lack of stimulation and inactivity on the stroke ward has been perceived by patients to impact on their ability to “drive” their own rehabilitation outside of therapy as they have described that time as “dead and wasted” (Eng et al., 2014, p. 4). Patients have reported the experience of boredom was worse in the evenings and weekends when there were fewer structured activities available (Kenah et al., 2018). They also perceived that boredom negatively influenced their mood, motivation, and contributed to their experience of post-stroke fatigue (Kenah et al., 2018). Boredom has been associated with a loss of autonomy and sense of control and was believed to contribute to patients becoming passive recipients of care, which may have negative implications for stroke recovery (Kenah et al., 2018).

Evidence in the community setting has suggested that a lack of social interaction can affect both neurological recovery (Kruithof et al., 2013) and health-related quality of life of patients following stroke (Huang et al., 2010; Kruithof et al., 2013). Loneliness and social isolation have been identified as risk factors for onset of disability (Lund et al., 2010) and cognitive decline in older people (Gray & Worlledge, 2018). The impact of social isolation on patients in hospital following stroke is not yet known. The lack of social interaction could negatively impact functional recovery and quality of life after stroke. Additionally, the time patients spend feeling bored could be considered wasted time that could otherwise have been used to stimulate neuroplasticity in the early stroke recovery period (Kenah et al., 2018).

2.2.3 The Role of the Communication Environment for Patients with Aphasia following Stroke

The language recovery of patients with aphasia (PWA) following stroke could be further disadvantaged within the hospital environment early after stroke. PWA have been observed to be significantly more communicatively inactive than patients without aphasia (PWOA) following stroke and spend two thirds less time engaged in social interactions with family and friends (Godecke et al., 2014). Current hospital systems and ward culture are perceived to make it difficult for health staff to offer patient-centred care to PWA (Carragher et al., 2020). Health staff reported that routine approaches to clinical interactions with patients were disrupted by aphasia (Carragher et al., 2020). Aphasia has been perceived to impact on everyday interactions and the ability of PWA to communicate their basic needs to health staff (Burns et al., 2015; Carragher et

al., 2020) and result in patient dissatisfaction (Hoffman et al., 2005) and disempowerment (Manning et al., 2019). Poor communication has been significantly associated with increased risk of experiencing a preventable adverse event in hospital (Bartlett et al., 2008). Patients with communication difficulties were three times more likely to experience an adverse event during their hospital admission than patients without communication difficulties (Bartlett et al., 2008). Preventable adverse events most commonly resulted in longer hospital admissions for 35% of patients, or readmission to hospital for 32% of patients (Bartlett et al., 2008). Within this study, 5% of those with a communication impairment who experienced a preventable adverse event developed a moderate impairment as a result of the adverse event which recovered within one year, 3% experienced a permanent impairment and 6% died (Bartlett et al., 2008).

Under-skilled health staff can also negatively influence the experiences of PWA during stroke recovery by providing negative or limited communication opportunities during their in-patient admission. Hospital based health staff identified a lack of knowledge of communication impairments and strategies which negatively impacted their engagement with PWA (Carragher et al., 2020; McGilton et al., 2009). Staff have reported that interacting with PWA was difficult and time consuming as they lacked the training, knowledge, skills and confidence to interact with this population (Burns et al., 2015; Carragher et al., 2020). Some health staff reported feeling dread related to interacting with PWA and limited or avoided conversations with them as a result (Burns et al., 2015; Carragher et al., 2020). Staff reported feeling concerned about the amount of time required for interacting with PWA and uncertainty about being able to understand them (Carragher et al., 2020). Health staff reported they want to help PWA, but they lacked the knowledge and resources to support their communication (Carragher et al., 2020).

In an observational study during early aphasia recovery, nurses were the most common communication partner for PWA after their family members (Godecke et al., 2014). However, time constraints often limited communicative opportunities between patients and nurses (Ball et al., 2014). A study which surveyed 2917 nurses working in the United Kingdom found that 86% of nurses reported one or more activities had been “left undone” in their last shift as a result of lack of time (Ball et al., 2014, p. 119). The activities most likely to be missed as a result of time constraints were comforting and talking to patients (66%) and patient education (52%) (Ball et al., 2014). Hersh et al., (2016) found that nurses provided restricted language opportunities within interactions with PWA in comparison to PWOA. PWA were often disempowered in communicative interactions with nurses, where nurses tended to talk to the task and controlled

the interactions. Additionally, nurses demonstrated few attempts to repair communication breakdowns and limited use of communication support strategies (Hersh et al., 2016).

PWA perceive the hospital environment to be a place of uncertainty and unfamiliarity, an environment which exacerbates their communication limitations beyond the level of their aphasia impairment (Clancy et al., 2020). PWA perceived elevated levels of noise (Blom Johansson et al., 2012; Clancy et al., 2020; Horton et al., 2016), interactions with unfamiliar communication partners, and communication partners who appeared stressed or busy were barriers to communicating within the hospital environment (Blom Johansson et al., 2012; Clancy et al., 2020). PWA felt it was important for their communication partners to have an understanding of aphasia and use communication strategies to meet their needs (Blom Johansson et al., 2012). PWA reported frustration, anger, sadness and loneliness as a result of communication breakdowns with health staff (Blom Johansson et al., 2012).

2.3 Environmental Interventions: Enriched Environments

2.3.1 *Use of an Enriched Environment in Animal models*

An enriched environment (EE) involves the provision of a challenging and stimulating environment which facilitates voluntary engagement in physical, cognitive and social activity (Nithianantharajah & Hannan, 2006). To date, this concept has been predominantly explored in animal stroke models (Biernaskie & Corbett, 2001; Janssen 2010; Johansson, 2003; Johansson & Belinchenko, 2002; Meshi et al., 2006; Nithianantharajah & Hannan, 2006). EE is typically achieved through housing a number of animals within large cages that are furnished with equipment such as running wheels, bedding, ropes, ladders, balls and chains. The physical environment is changed regularly to provide a challenging, complex and engaging environment to stimulate voluntary engagement with the targeted activities (Biernaskie & Corbett, 2001; Johansson, 2003; Johansson & Belinchenko, 2002; Meshi et al., 2006; Nithianantharajah & Hannan, 2006). Although the concept of standard housing typically varies between different laboratories, it generally encompasses housing rodents with other rodents of the same sex, with the environment consisting of bedding, food and water, with some standard environments consisting of small cages with one rodent in each cage (Nithianantharajah & Hannan, 2006). There has been debate regarding these standard environments reflecting socially isolated conditions, as standard conditions often involved small cages with often limited interaction with

other animals. However, observational stroke studies over the last 30 years suggests that current hospital ward environments may be considered more deprived than enriched.

Evidence from animal studies completed over several decades has demonstrated that an EE enhances learning and memory, promotes some elements of neuroplasticity and consistently improves stroke recovery (McDonald et al., 2018). Results from studies testing an EE in animal models of stroke indicated that recovering in these physically, cognitively and socially stimulating conditions contributed to significant improvements in motor function and a trend towards significant improvements in cognitive function (Janssen et al., 2010). Animals recovering from stroke in an EE scored around 25% higher on tests for learning than those recovering in non-enriched conditions (Janssen et al., 2010). Additionally, animals exposed to EE following stroke demonstrated significantly enhanced spatial learning and memory (McDonald et al., 2018).

Exposure to an EE during stroke recovery (in comparison to standard or deprived environments) has been associated with an increase in the number and variety of dendritic branches and spines in the somatosensory cortex (Johansson & Belinchenko, 2002), significant increases in the generation of astrocyte cells ipsilateral to the infarct and significant increases in the volume of bilateral granular cell layers (Komitova et al., 2002). This demonstrates that EE is associated with changes at the neuronal level indicative of neurorecovery after stroke. Initiating early exposure to an EE (between 5-14 days following stroke) in comparison to delayed exposure (after day 30) resulted in significant improvements in functional outcomes (Biernaskie et al., 2004). This suggests providing opportunities to engage in activity within an EE during early post-stroke recovery is one of the principles that underpins EE outcomes.

Exposure to an EE is not considered a substitute for therapy, but an adjunct to task specific rehabilitation (McDonald et al., 2018). Rodents who were exposed to an EE together with task specific rehabilitation demonstrated significant improvements in motor recovery compared to animals exposed only to EE or intensive rehabilitation (McDonald et al., 2018). The combination of EE and task specific rehabilitation is thought to have a synergising effect which promotes neuroplasticity processes in stroke recovery (McDonald et al., 2018).

2.3.2 Use of an Enriched Environment in the Clinical Setting with Patients following Stroke

Patients following stroke have reported they want opportunities to continue rehabilitation activities outside of therapy within the real-world environment (Eng et al., 2014).

Enriching the environment of patients during their in-patient stroke rehabilitation may be an efficient approach for encouraging activity outside of therapy times (Janssen et al., 2014b). Pilot research into the use of a human equivalent model of EE with patients following stroke, during their admission in an acute and a rehabilitation unit, suggested that this approach appeared to increase levels of physical, cognitive and social activity (Janssen et al., 2014b; Rosbergen et al., 2017a). Published EE models have not yet focussed on enhanced communication opportunities for patients following stroke. To date, EE models have involved the provision of individual and communal activities. This included access to a dining room and the provision of equipment including a computer with the internet, books (written and audio), newspapers, games and music (Janssen et al., 2014b; Rosbergen et al., 2017a). Participation within these EE models was patient driven, rather than therapist dependent, facilitating patients' engagement in greater levels of stimulating activity during non-therapy times (Janssen et al., 2014b). Pilot results found that patients exposed to EE on acute and rehabilitation stroke wards were significantly more likely to be engaged in activity than patients in the same ward prior to enrichment of the environment (Janssen et al., 2014b; Rosbergen et al., 2017a). Furthermore, patients exposed to EE were less likely to be observed sleeping and/or spending time alone (Janssen et al., 2014b; Rosbergen et al., 2017a). However, a recent Phase II trial found that although communal enrichment was available 100% of the time, individual enrichment was observed to be rarely within the patient's reach (24%) or within their sight (39%) (Janssen et al., 2021). This suggests factors limiting the uptake or access to the intervention within the hospital ward context need to be explored and addressed.

Qualitative research into the experience of patients following stroke within an EE reported the majority of patients perceived that being exposed to EE during their hospital admission for stroke rehabilitation was beneficial, and that an EE provided increased activities and social opportunities (White et al., 2016). Nurses perceived patients who had access to an EE appeared to have greater awareness and understanding of the benefit of participation in activity for their stroke recovery (Rosbergen et al., 2017b). Nurses reported that patient exposure to EE appeared to alleviate boredom and improved engagement (Rosbergen et al., 2017b). Nurses in the acute stroke setting found an EE shifted the perception of stroke management during early recovery from a focus on acute care to "acute care and recovery", commencing the rehabilitation process early (Rosbergen et al., 2017b, p. 4). An increase in social activity for patients within an EE during their rehabilitation was associated with an improvement in their mood (Janssen et al.,

2014b) and patients perceived they experienced benefit in sharing their experiences with other patients (White et al., 2014). Patients who did not access EE reported feeling bored, spent time by their bedside and were alone (White et al., 2014).

2.4 Environmental Interventions in Aphasia and Communication Management

Stroke survivors with aphasia and their carers report there is a need to provide a communicatively richer environment for PWA during hospital admissions (Clancy et al., 2020). Strategies suggested to improve communication in hospital include developing services, systems and policies to support improved communication, providing enough time for communication, ensuring access to communication tools and increasing the communication competence of health staff (Eadie et al., 2012; Hemsley & Balandin 2014; Hersh et al., 2016; McKinley et al., 2010; O'Halloran et al., 2014; O'Halloran & Rose, 2010; Simmons-Mackie et al., 2010). Patient-centred communication and care can be challenging to achieve within the hospital setting as a result of: the hospital setting itself; the roles within this environment, such as the power imbalance between staff and patients; staff knowledge and use of aphasia-friendly communication; staffing levels; and staff time constraints (Clancy et al., 2020).

2.4.1 Communication Enriched Environment

To date there has been limited work investigating communication within an enriched environment. One study by McMaster Harcourt et al., (2012) explored the concept of a communication enriched environment in a hospital setting for one patient with moderate-severe aphasia less than five months post-stroke. Their concept of a communication enriched environment was achieved by providing recommendations to the PWA and his wife regarding how to support enjoyable communication activities such as reading, writing, listening, and talking using a variety of modalities including an iPad, a smartphone, reading cards, photos, radio and television. The study found that following the development of this communication enriched environment, the proportion of communication activity levels the PWA engaged in remained unchanged, from 63.52% of 129 minutes of observation pre-intervention to 64.24% of 100 minutes of observation post-intervention. However, positive changes within communication interactions were evident. The patient took a more active role within the communication interaction where he maintained and extended conversational topics. He was observed to

initiate communication interactions and ask appropriate questions which resulted in a shift from a question-and-answer exchange to a “to and fro” style of exchange (McMaster Harcourt et al., 2012). This suggests that environmental interventions targeting increased engagement in communication has the potential to positively influence the quality of communication interactions for PWA.

2.4.2 Socialisation and Social Opportunities

Social interaction and social contact may provide increased opportunities for language use for PWA, utilising neuroplasticity processes early after stroke to promote language recovery. There are also potential benefits of social opportunities and relationships in promoting patients’ mood and health-related quality of life after stroke. This is related to social support from family, friends, and other patients during stroke recovery in hospital as well as after discharge from hospital.

Interactions between PWA and employed social visitors have resulted in clinical improvements in aphasia language outcomes (Bowen et al., 2012). Bowen et al., (2012) investigated the impact of interactions between PWA and employed social visitors, trained in providing “social attention”, interacting regularly with PWA (Bowen et al., 2012, p. 3). Visitors met with PWA up to three times per week over 13 weeks, providing on average 15 hours of contact per participant. These visitor sessions were provided in addition to usual care aphasia Speech Pathology only intervention, resulting in PWA in this group receiving, on average, 23 sessions with visitors and usual care speech pathologists. Visitors followed a manual designed to encourage engagement of PWA in their everyday activities and interests such as participating in conversation, watching television and listening to music, however activities were predominantly directed by PWA. The most common activity PWA completed with visitors was engaging in conversation. Following the intervention, clinically meaningful improvements in participants’ language function was observed at six-months post-stroke, measured by the Therapy Outcome Measure activity subscale (Enderby, 1997).

This study compared outcomes of PWA who received a comparable amount of Speech Pathology input over the same period of time, an average of 22 occasions of service with speech pathologists over 13 weeks. The amount and type of speech pathologist input was tailored to suit the needs of each PWA based on the speech pathologist’s clinical judgement. Speech pathologists provided direct patient contact (defined as “therapy to improve language skills”;

Bowen et al., 2012, p. 4) for 53% of these occasions of service. Of this direct patient contact, approximately 50% focussed on impairment-based aphasia therapy. Therefore, these direct impairment-based sessions accounted for approximately a quarter of the total amount of speech pathologists' occasions of service, approximately 5.75 occasions of service over the 13-week period. Speech pathologists' occasions of service otherwise involved contact with carers, PWA assessment, indirect input, or the provision of information and communication supporting materials. Results comparing language outcomes of these two patient groups resulted in comparable functional language improvements as assessed on the Therapy Outcome Measure activity subscale (Enderby, 1997). Additionally, comparable improvements were also observed in participants' self-reported functional communication and quality of life. Carers' perceptions of their own well-being and quality of life, and their perceptions of the functional communication ability of PWA was comparable between the two groups. This suggests that social contact with employed visitors has the potential to stimulate language recovery.

The provision of social opportunities and the development of social relationships has the potential to positively influence patients' mood in the hospital setting and after discharge from hospital. This is particularly pertinent considering a large proportion of stroke survivors report a decline in their participation in social activities after their stroke (Foley et al., 2019). Additionally, the incidence of depression in the stroke population is considered high, with approximately a third of stroke survivors reported to experience depression (Hackett & Pickles, 2014). A recent study also found that all participants with aphasia reported negative mood changes following aphasia onset which were not necessarily reflected in having a diagnosis of depression (Baker et al., 2019). Aphasia and the presence of depression resulted in disengagement in social opportunities and stroke rehabilitation activities (Baker et al., 2019). This potentially has negative consequences for further mood changes, as well as negatively influencing stroke recovery.

During hospital admission following stroke, social support received from friends has been positively correlated with patients' use of coping strategies (Tramonti et al., 2014). Additionally, increased social activity for patients exposed to EE during stroke rehabilitation was associated with an improvement in their mood (Janssen et al., 2014b). Patients with and without aphasia following stroke have identified they wanted to interact with other patients who were further along in their stroke recovery as potential sources of reinforcement, motivation, hope and comfort (Baker et al., 2019; Eng et al., 2014; Grohn et al., 2012). PWA also perceived benefit in meeting other people in hospital as an opportunity to meet new friends and have someone to

talk to (Grohn et al., 2012). Additionally, PWA reported that strong bonds with other patients were a “vital source of support and friendship” (Baker et al., 2019, p. 11). These relationships helped PWA feel “good, hopeful, stronger, happy” (Baker et al., 2019, p. 13).

Social opportunities with other patients in hospital may promote the development of social networks following discharge from hospital. Social supports after discharge from hospital mediate the impact of stroke related deficits on depression (Huang et al., 2010). This may be particularly important for PWA given aphasia has been associated with significant negative consequences for social participation and interpersonal relationships (Flowers et al., 2013; Kruithof et al., 2013). Additionally, PWA have reported feeling excluded from social situations (Baker et al., 2019). PWA reported that friendship networks made with other patients during their hospital admission provided opportunities for continuation of these friendships and support beyond their hospital admission (Baker et al., 2019). PWA reported they exchanged contact details with other patients with the aim to maintain friendships and connections after hospital discharge (Baker et al., 2019). Additionally, PWA perceived their relationships with their family, friends and stroke survivor peers to be very important in managing low mood (Baker et al., 2019). These networks were perceived as sources for support during what was considered an extremely challenging time in an individual’s life (Baker et al., 2019). Social support has been hypothesised to stimulate physiological function to promote stroke recovery and provide a means to reduce psychological stress, facilitate access to resources and promote positive health behaviours (Huang et al., 2010).

Although patients have demonstrated significant improvements in their functional status, and anxiety and depression scores during their stroke rehabilitation, these improvements have not necessarily translated to significant improvements in health-related quality of life (Tramonti et al., 2014). Studies have suggested a positive relationship between social support and stroke survivors’ health-related quality of life (Huang et al., 2010; Kruithof et al., 2013). Satisfaction with perceived social support at two weeks and three months post-stroke has been associated with better health-related quality of life for stroke survivors at three months post-stroke (Kruithof et al., 2013). Talking to other people and engaging in social and leisure activities in the first few weeks following hospital discharge were amongst the most important variables which contributed to health-related quality of life (Almborg et al., 2010). This was also evident in personal experiences, as PWA perceived engaging in meaningful activities, such as social interactions with family and friends, as factors that contributed to living successfully with aphasia

(Grohn et al., 2014). PWA perceived their societal participation was facilitated by opportunities to socialise, meet others, and engage in supportive environments within the community (Manning et al., 2019).

The hospital environment has the potential to provide opportunities for social interaction during early stroke recovery. Patients recovering in hospital following stroke have reported that they wanted social spaces that promoted conversations and interactions with other patients, which they perceived would reduce feelings of loneliness (Ana°ker et al., 2019). However, they perceived communal areas, such as the hospital patient lounge, as sterile and not conducive to promoting social interaction (Ana°ker et al., 2019). This was attributed to a lack of colour, art and furniture (Ana°ker et al., 2019). Patients perceived that furniture and furnishings within social spaces may promote relaxed and enjoyable social interactions (Ana°ker et al., 2019). The influence of furniture placement in hospital has been demonstrated in that when a table was placed in a patient's room, other patients sat at the table and interacted with one another (De Wit, 2005). Additionally, incidental social interactions occurred when patients were grouped together while waiting for therapy (De Wit, 2005). Group therapy also provided social opportunities for patients (De Wit, 2005; Fama et al., 2016) where PWA were observed to initiate communication more often in group therapy than individual therapy (Fama et al., 2016). This suggests that opportunities for communication and social interaction can be potentially promoted through the provision of furniture and furnishings within the hospital to create an appealing environment that promotes a relaxed and social atmosphere and opportunities for social interactions. Additionally, modification of hospital processes may also promote opportunities for social interaction, such as the provision of group activities and areas where patients can meet and interact with each other such as group therapy, waiting rooms, or communal areas.

2.4.3 Communication Access

Communication access is an environmental intervention that focusses on modifying the environment to promote the accessibility of health care for people with communication difficulties, including those with speech, hearing, vision and language difficulties (O'Halloran, 2010). Communication access within health care considers the communication needs of individuals to promote equitable health services as they access buildings and information, and interact with health staff (O'Halloran, 2010). The Australian Aphasia Rehabilitation Pathway is a

series of best practice statements guiding aphasia care in Australia (Centre of Research Excellence in Aphasia Research and Rehabilitation, 2014). Within these guidelines, The Australian Aphasia Rehabilitation Pathway recommends that communication accessible environments should be available for PWA. Communication access acknowledges that communication is a human right and equitable provision of health services results in improved patient outcomes including improved patient engagement, reduction in preventable adverse events, and better health-related quality of life (Hersh et al., 2016; Legg et al., 2005; McCabe, 2004; McGilton et al., 2009; Street et al., 2009).

Communication access has been explored in community settings and in the hospital environment (Eadie et al., 2012; Hemsley & Balandin 2014; Hersh et al., 2016; McKinley et al., 2010; O'Halloran et al., 2014; O'Halloran & Rose, 2010; Simmons-Mackie et al., 2010). Communication access within health care settings typically involve: written health care information in communicatively accessible formats; accessible signage and way finding; and access to skilled communication partners (O'Halloran, 2010). Factors that have been identified to facilitate communication access within the hospital setting included the accessibility of communication supporting resources and technology such as augmentative and alternative communication devices and call bells, the knowledge and attitudes of health staff, and services, systems and policies that promoted communication accessibility such as strategies that identified patients with communication disabilities (O'Halloran, 2010). Within a communication accessible environment, communication behaviours that demonstrated health staff valued communicating with patients included: gaining the patient's attention; providing the patient with information about their care; responding to the patient's communicative attempts; repeating or rephrasing questions; and checking the patients' responses (O'Halloran et al., 2012). Staff observation of skilled health providers interacting with patients with communication difficulties and the discussion of patients' communication abilities within team meetings have been identified as opportunities for staff acquisition of the knowledge and skills required to provide communication supporting strategies (O'Halloran et al., 2012). These strategies have been identified to promote communication access within a time-pressured and busy hospital environment (O'Halloran et al., 2012).

Health staff who attended communication access training reported training increased their knowledge of communication difficulties and disorders, and increased their confidence in communicating with people with communication difficulties (McKinley, et al., 2010). Staff

reported they developed accessible written health information and used communication supporting strategies such as booking longer appointment times to facilitate communication within health appointments (McKinley, et al., 2010). Staff also reported they enhanced the physical environment to be more comfortable and accessible through the use of plants and improved signage (McKinley, et al., 2010). Patients have reported they felt understood, supported, and cared for within interactions with health staff who demonstrated behaviours that reflected they valued communicating with patients (O'Halloran et al., 2012). Additionally, patient engagement has been promoted when health staff demonstrated they valued patient-professional relationships by using active listening and embedding relationship building within clinical interactions, making an effort to get to know patients and focussing on patients' priorities (Bright et al., 2018). Speech pathologists perceived that a communicatively accessible environment had potential to benefit all people accessing health care services as improved communication access can lead to individualised patient care (O'Halloran et al., 2014). Speech pathologists perceived that a communication accessible environment can promote person-centred care through effective health provider and patient communication (O'Halloran et al., 2014). This has the potential to reduce preventable adverse events, improve patient satisfaction of their care and reduce patient complaints (O'Halloran et al., 2014).

2.4.4 Communication Partner Training

The Australian Aphasia Rehabilitation Pathway best practice statement suggests that communication partner training should be provided to enhance the communication environment for PWA (Centre of Research Excellence in Aphasia Research and Rehabilitation, 2014). Communication partner training may provide health staff with the skills required to support effective communication with PWA (Horton et al., 2016; Jensen et al., 2015; Simmons-Mackie et al., 2010). Health staff may provide important opportunities to integrate communication into everyday routines and interactions through the employment of communication strategies (Hersh et al., 2016). Research has suggested that PWA valued positive interactions with healthcare providers which helped them feel empowered to manage their own long-term care (Manning et al., 2019). PWA also perceived their participation in activities was facilitated by having skilled conversation partners (Manning et al., 2019). PWA were not always supported to communicate, be independent or make decisions in hospital, which had negative consequences for their mood (Baker et al., 2019). In order to address low mood in PWA during their hospital admission, health

staff need to have communication supporting skills to promote patient access to specialists such as clinical psychologists (Baker et al., 2019).

Studies on communication partner training found it significantly improved health staff knowledge of aphasia and their attitudes towards communication (Horton et al., 2016; Jensen et al., 2015; McGilton et al., 2009). Health staff also reported they prioritised communication after training and had increased awareness of the individual needs of PWA (Horton et al., 2016). Health staff reported that after participating in aphasia communication partner training they changed their communication style to suit the communication needs of PWA, where the majority of health staff integrated the skills learnt in training into their work routines (Horton et al., 2016). Following communication partner training, nursing staff reported feeling less frustrated as communicative effectiveness made it easier to work with PWA (McGilton et al., 2009). They perceived that training saved time, reduced frustration and reduced the burden associated with caring for PWA (McGilton et al., 2009). Communication trained medical students demonstrated a significant increase in their ability to effectively conduct a medical review with PWA (Legg et al., 2005). Medical students who completed communication partner training demonstrated significant improvements in their use of communication strategies which resulted in improvements in their ability to develop rapport and explore patient problems (Legg et al., 2005). When interacting with trained health workers, PWA perceived their communication abilities significantly increased and as a result they felt less anxious and agitated (McGilton et al., 2009). Communication partner training may result in effective and efficient transfer of information between patients and health professionals, resulting in more accurate patient diagnoses, care and treatment, better patient outcomes and improved professional-patient relationships (Hersh et al., 2016; Legg et al., 2005; McCabe, 2004; McGilton et al., 2009; Street et al., 2009).

2.5 Summary

The current hospital environment may be considered to be impoverished, with patients following stroke spending large proportions of their day alone, inactive (Janssen et al., 2014a), and feeling bored and lonely (Kenah et al., 2018). PWA may be further disadvantaged in hospital through a lack of opportunity for communication exchanges with health staff who often limit or avoid interactions with them as a result of being time poor or lacking the knowledge and skills in

using communication supportive strategies (Ball et al., 2014; Burns et al., 2015; Carragher et al., 2020).

An EE involves the provision of a challenging and stimulating environment which facilitates voluntary engagement in physical, cognitive and social activity (Nithianantharajah & Hannan, 2006). Animal models of EE have demonstrated enhanced learning and memory, promoted some elements of neuroplasticity and consistently enhanced recovery from stroke (McDonald et al., 2018). Pilot studies investigating the human equivalent EE model found that patients exposed to EE on acute and rehabilitation stroke wards were significantly more likely to be engaged in activity than patients in the same non-enriched ward (Janssen et al., 2014b; Rosbergen et al., 2017a). However, the relationship between EE and improved functional stroke outcomes in humans is yet to be demonstrated (Janssen et al., 2021).

Published EE models to date have yet to focus on language within the EE. There is a need to build on the framework of an EE and early work exploring a communication enriched environment drawing on research from communication access, social approaches to communication, and communication partner training, to explore the concept of a Communication Enhanced Environment (CEE) model. A CEE model is an adapted model of EE which considers the complexities and communication needs of PWA within the hospital environment. Where an EE seeks to provide opportunities for patients to freely engage in activity as they desire, we propose an enhanced environment is needed for PWA, where engagement in activities for PWA may need to be supported and facilitated. As a fundamental feature of human interaction, enhanced language activity during stroke recovery has the potential to augment neuroplasticity processes. This could promote: aphasia language recovery; communication exchange between patients following stroke and health staff; and opportunities for engagement in meaningful activities and social interactions. Further benefits to enhanced language activity include mitigation of patient boredom and promotion of patient mood and well-being. This has the potential to increase patient engagement in rehabilitation and patient-centred care through improved health care communication access and communication partner trained health staff. Effective and efficient nurse-patient communication as a result of nurse training saves time and reduces the frustration and burden associated with caring for PWA (McGilton et al., 2009). Improved staff-patient communication may also result in more accurate patient diagnoses, care and treatment, better patient outcomes and improved professional patient relationships (Legg et al., 2005; McCabe, 2004; McGilton et al., 2009; Hersh et al., 2016; Street et al., 2009).

Chapter 3. Implementation Science Theoretical Framework

This chapter introduces the concept of implementation science, which guided the design and approach used in this study, to develop and implement a Communication Enhanced Environment (CEE) model. This chapter introduces the concept of the evidence to practice gap which is evident in both stroke and aphasia management. Implementation science is discussed, followed by an introduction to the implementation science frameworks used to guide the development of this study including the Knowledge-to-Action framework (Graham et al., 2006), the COM-B model (Michie et al., 2011), and the behaviour change taxonomy (Michie et al., 2015).

3.1 The Evidence to Practice Gap

Research evidence does not automatically translate into evidence-based practice (Balas & Boren, 2000). It has been estimated that approximately 50% of research evidence is successfully translated into clinical practice (Balas & Boren, 2000). In addition, the process of translating research evidence into clinical practice is reported to take at least 17 years (Balas & Boren, 2000). A contributing factor may be that the findings from studies completed in carefully controlled clinical settings with specific patient cohorts, as seen within randomised controlled trials, are not easily generalised to complex and variable patient and clinical contexts in the real-world (Lynch et al., 2018b).

The Stroke Foundation's audit data have revealed evidence-practice gaps in current Australian stroke management in the acute and rehabilitation settings (Lynch et al., 2018b; Stroke Foundation, 2019; Stroke Foundation, 2020a). The most recent acute audit revealed the Australian Clinical Guidelines for stroke management were used in 67% of hospitals an acute stroke unit, and 31% of hospitals without an acute stroke unit (Stroke Foundation, 2019). Additionally, one in five rehabilitation services met less than half of the Australian Clinical Guidelines for stroke management (Stroke Foundation, 2020a). Research suggests the evidence to practice gap is also present in aphasia management (Ferreira et al., 2016; Vogel et al., 2010). An audit of Speech Pathology services in an Australian hospital found that PWA received an average of 44 minutes of aphasia therapy during early stroke recovery (Ferreira et al., 2016), which fell significantly below the Stroke Foundation's guidelines (Stroke Foundation, 2020b). Additionally, a survey of 174 speech pathologists in Australia found that over 70% of respondents

most commonly assessed language using informal or unvalidated clinical assessments (Vogel et al., 2010) despite the Stroke Foundation's guidelines indicating that all patients following stroke should have their communication screened using a valid and reliable screening tool (Stroke Foundation, 2020b).

3.2 Implementation Science

Implementation science aims to address the evidence to practice gap through the provision of frameworks to guide the application of research within clinical practice, including the design of projects and the evaluation of research uptake (Peters et al., 2013). This involves designing interventions to meet the needs of the health care context, including the hospital system, policies, procedures and stakeholders (Lynch et al., 2018a). Implementation science involves the utilisation of strategies to facilitate change at an individual and organisational level by providing guidance on ways to introduce, embed and sustain new behaviours and practices (Bauer & Kirchner, 2020). Studies that adopt and apply implementation science frameworks aim to arrive at the optimal implementation strategy with the maximum innovation impact (Bauer & Kirchner, 2020).

Contextual issues are considered a common barrier limiting the implementation of evidence in practice (Bauer & Kirchner 2020). Studies that focus on translating evidence into clinical practice using implementation science frameworks differ from clinical trials in that extraneous variables are not controlled (Bauer & Kirchner, 2020). These extraneous variables are considered a reflection of the real-world setting (Bauer & Kirchner, 2020). Therefore, the focus is shifted to the transferability of the intervention in the real-world (Bauer & Kirchner, 2020). The goal is to identify factors that influence the uptake of the clinical intervention across multiple contexts including: the treatment; the providers of the intervention; the organisation; and other stakeholder groups, and then develop and apply strategies to address these (Bauer & Kirchner, 2020). The use of implementation science frameworks allows the systematic approach to identifying and addressing barriers, as well as promoting facilitators of behaviour change (Shrubsole et al., 2019). The consideration of implementation science and behaviour change models in the pilot stage of research may inform the development of an individual and service-level intervention that can be readily implemented in clinical practice. As a result, this may promote large scale behaviour change and help to reduce the research evidence to practice gap that is evident in health.

While implementation science as a field has been developed over an extended period of time, its application to the field of stroke rehabilitation is a relatively emerging area of research. A recent Cochrane review investigated the effect of implementation science strategies in health care settings' adherence to stroke management guidelines (Cahill et al., 2020). The results of the review indicated that implementation science strategies did not alter adherence to evidence-based practice, or health outcomes (Cahill et al., 2020). However, given there were a small number of studies included in the review, this finding may reflect the emerging nature of this area in stroke management (Cahill et al., 2020). Only 2.5% of stroke rehabilitation studies have been identified to focus on implementation (Lynch et al., 2018b). Additionally, a recent review of implementation science literature in aphasia research found only six studies focussed on the implementation of aphasia research evidence (Shrubsole et al., 2018). Implementation science literature in aphasia, to date, has focussed on the implementation of established research evidence such as communication partner training, discourse analysis, information provision, and goal setting (Shrubsole et al., 2018).

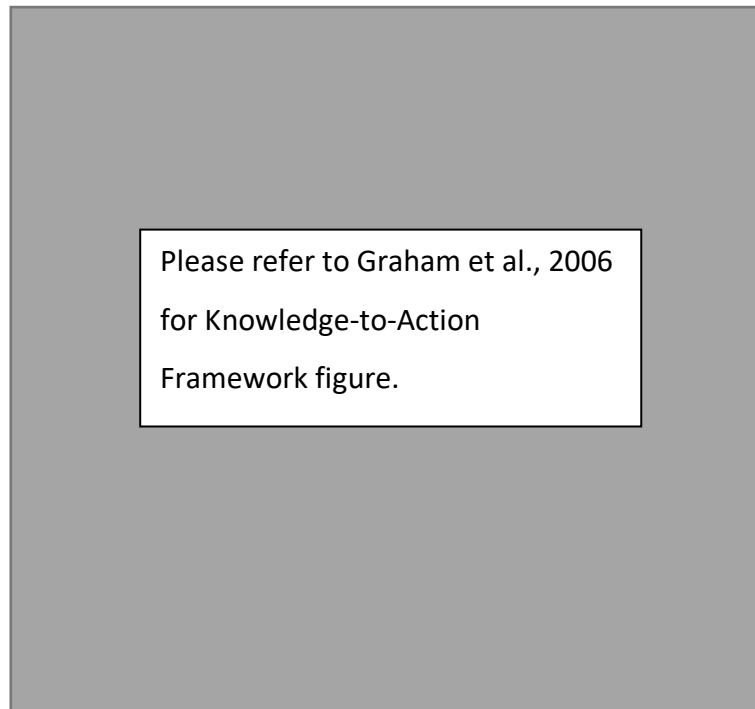
There is no research evidence or expert consensus regarding the optimal implementation science approach, model or theory to guide implementation studies on health interventions (Lynch et al., 2018a). The Cochrane review recommended that implementation should be informed by the broader body of evidence in implementations science, and "the likely mechanism of action of intervention and local factors influencing translation including acceptability and feasibility of interventions" until the stroke specific implementation science research "matures" (Cahill et al., 2020, p. 26). Shrubsole et al., (2019) suggest taking a multilevel approach involving a combination of theories tailored to meet the research questions given there is no single theory that can explain or predict all possible variances in the uptake of interventions.

3.3 The Knowledge-to-Action Framework

Graham et al. (2006) developed the Knowledge-to-Action (KTA) framework (Figure 1) to explain the process of implementing evidence (knowledge) in clinical practice (action). This process is considered to be complex and dynamic, where the phases of knowledge and action may occur sequentially or simultaneously, and knowledge can inform action, and action can inform knowledge.

Figure 1.

Knowledge-to-Action Framework, reproduced with permission (Graham et al., 2006)



The *knowledge creation* component within the KTA framework has three phases: i) the knowledge inquiry phase, which involves primary studies; ii) the knowledge synthesis phase, where meta-analyses and systematic reviews are conducted; and the iii) the knowledge tools and products phase, where policies and clinical guidelines are developed.

The *action cycle* is the process of implementation of the knowledge, or the application of knowledge. The action cycle represents activities that may be needed in order to implement or use knowledge. Within the action cycle, a framework to facilitate this process is proposed. The first step is identifying a problem that needs addressing. This is followed by identifying, reviewing, and selecting the knowledge or research that is relevant to the identified problem. The knowledge or research then needs to be adapted to the local context. This involves assessing any barriers to using the knowledge as well as selecting, tailoring, and implementing interventions to suit the context. Then knowledge use is monitored, followed by the evaluation of the outcomes related to knowledge use. Strategies to promote sustained knowledge use are then considered and implemented.

3.4 The COM-B model: Capability, Opportunity and Motivation

As a supplement to the 'Knowledge-to-Action' framework, the COM-B model specifically incorporates the notion of behaviour change and how this is achieved. Behaviour change models have become a dominant framework in designing behaviour change interventions (Shrubsole et al., 2019). They are based on theories of how behaviour can be influenced in order to create change. Behaviour change models used in health-based implementation science studies are predominantly informed by the psychology of behaviour change such as that involved in smoking cessation (Shrubsole et al., 2019). Michie et al., (2011) developed a behaviour change framework from a systematic search of behaviour change interventions. The proposed framework, the COM-B model, incorporates three inter-related components: *capability* (C); *opportunity* (O); and *motivation* (M), that are believed to generate a targeted *behaviour* (B).

Capability refers to the physical strength, knowledge and psychological skills that are needed to perform the targeted behaviour. *Opportunity* considers the physical and social environment which enables an individual to feel they are able to undertake the targeted behaviour. This includes the context surrounding individuals, and all the factors beyond the individual that make a behaviour possible or prompt the targeted behaviour. *Motivation* refers to the basic drives and automatic processes (such as habit, impulses, intent and choice) that direct a behaviour. This includes both conscious processes such as goal setting and thoughtful decision making, as well as subconscious processes, such as habits and emotional responses. The components within the intervention and implementation approach can reduce or promote behaviours, for example, positive experiences can result in the increased use of the intervention. *Capability*, *opportunity*, and *motivation* are all considered to interact and influence one another. For example, increased opportunities can increase motivation, and reduced opportunities can reduce motivation.

3.5 Behaviour Change Taxonomy

Michie et al. (2011, 2015) argue that vague or poorly described interventions within protocols and manuscripts make it difficult to ascertain the active ingredients or the specific content of implementation approaches. Michie et al. (2011) proposed a need for shared and standardised methods for classifying implementation content. They developed a behaviour change taxonomy with 93 distinct behaviour change techniques which they suggest should be

used in the specification of ‘active ingredients’ of behaviour change interventions. They propose the use a single behaviour change taxonomy promotes: i) accurate replication of interventions; ii) specified content to facilitate implementation of protocols in research; iii) extraction of data in systematic reviews and meta-analyses; iv) identification of a comprehensive list of behaviour change techniques that can be used to promote behaviour change in an intervention; and v) the investigation of possible factors that promote behaviour change and implementation of interventions (Michie et al., 2011; Michie et al., 2015).

3.6 Summary

Implementation science involves the utilisation of strategies to facilitate change at an individual and organisational level by guiding how to introduce, embed and sustain new behaviours and practices (Bauer & Kirchner, 2020). A multi-level approach involving a combination of implementation science theories has been recommended (Shrubsole et al., 2019) in the context of a lack of consensus regarding the optimal implementation science approach, model or theory in health interventions (Lynch et al., 2018a). The KTA framework provides a basis to understand the process of implementing evidence (knowledge) in clinical practice (action). The action cycle within the KTA framework provides a description of activities that may be needed in order to implement or use knowledge, interventions or evidence. Additionally, behaviour change models, based on the psychology of how and why individuals change behaviours, have become a dominant framework in designing behaviour change interventions (Shrubsole et al., 2019). The COM-B model can be used to guide behaviour change interventions. Additionally, reporting behaviour change strategies using a behaviour change taxonomy can facilitate the reporting of ‘active ingredients’ within behaviour change interventions, promote replicability and facilitate understanding of strategies that promote behaviour (Michie et al., 2011; Michie et al., 2015). The use of these frameworks provides a basis for developing an intervention that meets the needs of the health care context, including the hospital system, policies, procedures and stakeholders (Lynch et al., 2018a). This can facilitate change at an individual and organisational level by guiding how to introduce, embed and sustain new behaviours and practices (Bauer & Kirchner, 2020). This study used the KTA framework, the COM-B model, and a behaviour change taxonomy to inform the design of this research and the development and implementation of the CEE model. How each of these frameworks were applied within the context of this study are discussed in Chapter 6.

Chapter 4. Methodological Framework

4.1 Study Design

This study is a mixed methods prospective before-and-after pilot study in an acute ward and a rehabilitation ward of a metropolitan private hospital. As a basis for implementation of an individual and systems-level behavioural change intervention, the study design aligned with implementation science principles as reflected in the Knowledge-to-Action (KTA) framework (Graham et al., 2006), the COM-B model (Michie et al., 2011) and the behaviour change taxonomy (Michie et al., 2015).

The study involved three phases:

- i) Before phase: observed and quantified the usual care ward environments to conduct a problem analysis, an assessment of readiness for change, and an assessment of barriers to knowledge use;
- ii) Implementation phase: developed the Communication Enhanced Environment (CEE) model, adapted it to the local context and used implementation and behaviour change strategies to embed the CEE model in usual care, as well as strategies to promote the sustained use of the CEE model;
- iii) After phase: assessed the use and investigated the effects of the CEE model.

4.1.1 Qualitative Methodological Framework

A qualitative description approach was used for the qualitative component of this research as it enabled the description of participant experiences, perspectives and insights into this research topic (Bradshaw et al., 2017; Jiggins Colorafi & Evans, 2016; Neergaard et al., 2009). The ontological assumption for qualitative description lies within a naturalistic approach which relies on understanding a phenomenon through the meaning that participants ascribe to them (Bradshaw et al., 2017). The epistemological assumption for qualitative description is subjectivism (Bradshaw et al., 2017). This is based on real-world phenomena and that the world does not exist independently of our knowledge of it (Bradshaw et al., 2017). It relies wholly on someone's subjective knowledge of the world, also acknowledges the role of the researcher and their biases within the study (Bradshaw et al., 2017). This approach allowed the researcher to gain knowledge through the description of the participants' points of view as they were presented, with only minimal interpretation from the researchers (Bradshaw et al., 2017; Jiggins

Colorafi & Evans, 2016; Neergaard et al., 2009; Sandelowski, 2000). This means that the “expected outcome of qualitative descriptive studies is a straightforward descriptive summary of the informational contents of data organized in a way that best fits the data” (Sandelowski, 2000, p. 339). Qualitative description has been identified as an appropriate approach to inform the development and refinement of an intervention program involving a vulnerable participant group (Neergaard et al., 2009). Additionally, it is considered well suited to a project with limited time and resources (Neergaard et al., 2009).

4.2 Setting

The study was conducted at a private hospital in Perth, Western Australia. Two wards were selected to participate in this study, an acute and a rehabilitation ward. The hospital underwent renovations throughout the study timeframe, resulting in reorganisation of the acute ward. As a result, the before phase was conducted on the acute ward and the rehabilitation ward. The implementation phase initially started on the acute ward and the rehabilitation ward, however the acute ward moved to become a combined acute and slow stream rehabilitation ward. This meant the after phase was conducted on the combined acute and slow stream rehabilitation ward and the rehabilitation ward.

4.3 Participants

- i) Patients following stroke: The control group (n=7, patients with aphasia (PWA)=3; patients without aphasia (PWOA)=4) recruited in the before phase, and the intervention group (n=7, PWA=4, PWOA=3) recruited in the after phase.
- ii) Staff and hospital volunteers: Acute and rehabilitation doctors, nurses, allied health staff and volunteers in the before phase (n=51), and nurses, allied health staff and volunteers in the after phase (n=22). Please refer to Table 1 for a breakdown of the staff participant professions in each phase of the study.

Table 1.

Staff Participants in the Before-and-After Phases

| Staff/volunteer group (n) | Before phase | After Phase |
|---------------------------|--------------|-------------|
|---------------------------|--------------|-------------|

| | | |
|---|---|---|
| Acute and slow stream rehabilitation nurses | 2 | 3 |
| Clinical nurse manager | 1 | 0 |
| Dietitian | 1 | 0 |
| Medical consultants | 2 | 0 |
| Occupational Therapy assistants | 3 | 1 |
| Physiotherapists | 8 | 7 |
| Physiotherapy assistants | 2 | 0 |
| Rehabilitation nurses | 8 | 4 |
| Social workers | 5 | 1 |
| Speech pathologists | 4 | 2 |
| Speech Pathology assistant | 1 | 0 |
| Speech Pathology manager | 1 | 1 |
| Volunteer manager | 1 | 1 |
| Volunteers | 6 | 2 |

4.3.1 Participant Inclusion and Exclusion Criteria

Patients were eligible for inclusion if they were: admitted to the participating wards with a stroke; less than 21 days post-stroke during data collection; had the ability to provide informed consent as determined by the medical team; a Glasgow Coma Scale (Teasdale & Jennett, 1974) score greater than 10 at the time of screening; an estimated length of hospital stay greater than 14 days; adequate English proficiency to participate in semi-structured interviews as determined by the medical team; and were above 18 years of age. PWA also had an Aphasia Quotient score below 93.7 on the Western Aphasia Battery-Revised (Kertesz, 2006).

Patients were excluded if they: had uncorrected hearing or vision; were not medically stable; had a documented diagnosis of dementia, traumatic brain injury or previous aphasia; had a documented current untreated depression at the time of their admission; or were a participant in another research trial which may have affected this study's outcome measures.

4.4 Study Assessments and Procedures

4.4.1 Before Phase

Quantitative Data Collection. All recruited patients completed the baseline assessments: the Montreal Cognitive Assessment (Nasreddine et al., 2005); and the NIH Stroke Scale (National Institute of Neurological Disorders and Stroke, 2011). PWA also completed the Western Aphasia Battery-Revised to provide an impairment-based measure of aphasia severity (Kertesz, 2006). Behaviour mapping was then used to track each patient's engagement in language activities over 12 hours. Each patient was observed across three blocks of time on a Monday and a Tuesday, and either a Saturday or a Sunday. Each observation block lasted for four hours between 7am to 7pm. Behavioural mapping was completed for the first minute of every five minutes during each observation period (144 observations per patient over 12 hours). Observation times were randomly allocated and ensured that each control and intervention participant group had timeslots allocated that captured one observation period (0700-1100, 1100-1500, 1500-1900) over the three days of observation.

A behaviour mapping tool adapted from a previous enriched environment study (Janssen et al, 2014a) was used to record patient engagement in language activities. A language activity was defined as any activity in which a patient engaged in verbal (i.e., speaking) or non-verbal language (i.e., listening, using gestures or reading). The language activity could be further categorised as a solitary or an interactive language activity. A solitary activity was defined as a functional or non-functional/non-propositional language task which could be completed alone (i.e., reading, writing, listening to the radio, singing, or using language apps on an electronic tablet). An interactive activity was defined as an exchange of information with a communication partner present in person, virtually or via the phone (i.e., talking, gesture and/or facial expression, reading, writing or drawing to communicate). Patients were reported to be unobserved if they were using amenities, interacting with the observer, unable to be located, or if their communication partner did not consent to being observed.

Extraneous factors that may have influenced outcome measures were recorded and monitored throughout the before, implementation and after phases. This included: total number of visitors during patient observation periods; number of patients on the ward; nurse/staff-to-patient ratios; average stroke severity on the ward; and the number and disciplines of students working on the wards.

Qualitative Data Collection. *Patient Interviews.* Semi-structured interviews were completed with each patient within 24 hours of their final observation. Interview guides were used for all patient interviews (see Chapter 5, Appendix C for control group interview guide). Interviews with the PWA were conducted using supported communication strategies (Kagan, 1998) to facilitate participation and successful information exchange. Within the control group interviews a component of the problem analysis was completed as participants were asked questions to explore their perceptions of barriers and facilitators to engaging in communication and language activities within the ward environment.

Staff Focus Groups. Staff focus groups were conducted during the before phase to complete the problem analysis, provide an assessment of the readiness for change and to identify barriers to knowledge use through exploring individuals' perceptions of barriers and facilitators to patient communication. Focus groups with staff and volunteers also explored their perspectives of potential opportunities to enhance communication and language activities for patients, and their perceptions of what could be included in the CEE model. All staff focus groups were conducted using focus group guides and were audio recorded (see Chapter 5, Appendix B for the before phase staff focus group guide).

4.4.2 Implementation Phase

The CEE model was developed and embedded in the ward environment during the implementation phase. The CEE model initiatives were initially developed from baseline data from patient observations, staff focus groups and interviews, patient interviews, as well as the expert opinion of the research team. The model was developed considering the following research and theory: i) the principles of neuroplasticity in the context of post-stroke aphasia (Brogan et al., 2020; Kiran & Thompson, 2019; Wilson & Schneck, 2020); ii) the World Health Organization International Classification of Functioning, Disability and Health model (World Health Organization, 2001); ii) environmental enrichment studies in both animals (Janssen et al., 2010; McDonald et al., 2018) and human trials (Janssen et al., 2014b; Rosbergen et al., 2017a); and iii) communication access (Eadie et al., 2012; Hemsley & Balandin 2014; Hersh et al., 2016; McKinley et al., 2010; O'Halloran et al., 2014; O'Halloran & Rose, 2010; Simmons-Mackie et al., 2010) and communication partner training in the hospital environment (Horton et al., 2016; Jensen et al., 2015; Simmons-Mackie et al., 2010). The model development also considered the use of behaviour change strategies (Michie et al., 2015) and strategies to promote of capabilities,

opportunities and motivation (Michie et al., 2011) of staff and volunteers to promote use of the intervention with patients.

During the implementation phase, a hospital and research working party was established involving key members of the acute and rehabilitation stroke multidisciplinary team including a senior physiotherapist, a speech pathologist, the volunteer manager, the speech pathology manager and the acute and rehabilitation ward nurse managers. The working party met four times, where the baseline data was presented to the working party. The research team proposed the CEE model initiatives. The working party further developed the CEE model initiatives to align with hospital policies and procedures, staff values and perceived feasibility within the specific ward environments. Each initiative was discussed in detail including the perceived barriers to each initiative and strategies to overcome these barriers considering staffing allocation and available resources. After each meeting, written minutes were disseminated amongst the working party. This included a summary of the progress of the discussion and agreed approach for each model initiative.

Further description of the processes involved in the development of the CEE model is reported in Chapter 6. Chapter 6 and Chapter 9 also include a detailed description of the CEE model. The implementation process is discussed in detail in Chapter 6 and staff roles in the CEE model are discussed in Chapter 9. Each patient's level of involvement in the CEE model is discussed in Chapter 6.

Staff and volunteers completed a voluntary survey (see Chapter 7, Appendix J) to provide feedback on the CEE model and aphasia communication partner training sessions. This was conducted immediately following participation in the training. The survey had three Likert scale (0-10) statements to determine staff and volunteers' perceptions of the training in regard to relevance, informativeness and allocation of time in the session. The survey also had four open statements/questions to determine: what staff and volunteers liked about the training program; the aspects of the training program they perceived could be improved; how staff and volunteers planned to change their practice as a result of training, as well as an opportunity to provide any other comments.

4.4.3 After Phase

The availability of the CEE model was monitored by the hospital site champions (a senior physiotherapist and a speech pathologist). The intervention group patient observations and

interviews, and staff focus groups in the after phase replicated the processes of the before phase data collection. The impact of the CEE model was explored through intervention group patient interviews by exploring their perceptions of barriers and facilitators to communication in the ward environment with the model embedded in usual care. Interviews also explored their experiences with the CEE model initiatives they were exposed to (see Chapter 8, Table 13 for intervention group interview guide). Additional questions were asked of individual patients during interviews regarding any comments they made in relation to the environment during observational behaviour mapping data collection. Staff in the after phase focus groups were also asked about their opinion on each element of the CEE model, and their experiences in implementing the model (see Chapter 9, Table 15 for the after phase staff focus group guide).

4.5 Data Analysis

Quantitative Data. Outcome i. The availability of each CEE model initiative, as a proportion of the total, was used to calculate the average availability of the CEE model for the intervention group. This was determined by the hospital site champions at the time of patient observations for each recruited participant.

Outcome ii. The proportion of observed episodes where PWA and PWOA were engaged in language activities in the before-and-after phases were analysed using a mixed design ANOVA. Observation data gathered was collapsed across all observational periods for each patient to calculate the average frequency patients spent engaged in language activity expressed as a percentage of total activity observed.

Qualitative Data. Outcomes iii., iv. and v. The interviews and focus group data were transcribed word for word to ensure the authenticity of the transcriptions. The transcripts were checked by re-reading the data while listening to the audio recording of the interviews to ensure that participants were accurately represented. The audio recordings were checked by the first author during the transcription process to identify possible leading questions and responses to any leading questions were removed from the data set.

The qualitative data were analysed using NVivo computer software (2018). Data were broken down into smaller units of codes and were grouped into categories according to their content. During the categorisation of data, single lines were not removed from their 'story'. The spoken context around the data was visible to maintain the context and to help ensure the meaning was not lost or misinterpreted. A large number of codes were identified initially, but

after further analysis, codes were grouped into categories (Bradshaw et al., 2017; Jiggins Colorafi & Evans, 2016). As data were analysed and new themes emerged, data that had already been analysed were checked to determine their fit within the new categories (Jiggins Colorafi & Evans, 2016; Milne & Oberle, 2005). Two other researchers (supervisors on this project) assisted with data analysis and reviewed all themes to ensure they reflected the data collected. During the second review, theme titles and descriptions were developed to provide a representative description of the data (Jiggins Colorafi & Evans, 2016).

Post Hoc Analyses. Post hoc analyses were completed using Pearson's r correlation coefficient, one-way ANOVAs, and two-way ANOVAs to analyse: the influence of the presence of aphasia on patient activity levels; differences between groups in patient engagement in solitary and interactive language activities; and the proportion of time patients spent watching television, before-and-after implementing the CEE model. This was also analysed in relation to patient mobility status which was obtained from the patient's medical records as determined by the ward physiotherapist. Triangulation of the qualitative and quantitative data were conducted.

4.6 Qualitative Rigour

The first author, a female speech pathologist (Bachelor of Speech Pathology, Honours) and PhD student completed all semi-structured interviews and focus groups. During the before phase, the first author had four years clinical experience working in the hospital setting and five years research experience, including conducting interviews and focus groups. During the after phase, the first author had seven years clinical experience working in the hospital setting and eight years research experience. Patients were informed that the researchers wanted to explore how the hospital environment influenced patient activity. In the before phase, staff were informed that the researchers wanted to investigate their perceptions of the hospital ward environment in regard to communication opportunities to inform the development of a CEE model. In the after phase, staff were informed that the researchers wanted to explore their experiences of the implementation and use of the CEE model. All participants were encouraged to provide honest feedback, to include both positive and negative experiences, as well as areas for improvement of the CEE model.

Rigour can be enhanced through the use of strategies to ensure: the authenticity of the data; the credibility of the findings; the critical appraisal of decision making; and maintain the integrity of the data and research findings (Jiggins Colorafi & Evans, 2016; Milne & Oberle, 2005).

Interviews with patients were predominantly conducted in a one-on-one situation, however if patients requested, their family members were also present. This was to allow in-depth discussion and probing of potentially distressing or sensitive topics (Milne & Oberle, 2005). Interviews with PWA were conducted using supported communication strategies, including visual supports, to facilitate their participation and successful information exchange in the interview.

Focus groups were used for staff qualitative data collection to promote group discussion and gain a broad insight into the research topic (Milne & Oberle, 2005). Hearing others' thoughts and opinions may have encouraged staff participants to provide their perspectives which may not otherwise have emerged in a one-on-one interview setting (Neergaard et al., 2009). Staff participants had the opportunity to agree or disagree with others' perspectives to provide rich data (Neergaard et al., 2009) that was triangulated with patient interviews and quantitative data. In this context, the researcher adopted the role of a facilitator enabling the discussion to be participant driven, promoting the authenticity of the data (Neergaard et al., 2009).

The authenticity of the data was further promoted by ensuring that all participants had the "freedom to speak" during interviews and focus groups (Milne & Oberle, 2005, p. 413). Open-ended questions were used to allow the exploration of the topic in focus, however the open nature of the questions allowed the participants to tell their own stories. The researcher did not attempt to control, influence or structure the participants' stories. Therefore, the researcher did not interrupt the participant while they told their story nor tried to redirect them if they appeared off track. The researcher took notes while the participant was talking and when they had finished their story the researcher asked probing questions to clarify and/or seek further information. This helped ensure the data was participant driven rather than influenced by the researcher's assumptions and experiences. This process may also have facilitated the development of trust between the researcher and the participant which resulted in the collection of rich in-depth data. The researcher wrote detailed case notes during and after the interviews and focus groups in regard to observations, impressions and assumptions that emerged. Participants' non-verbal behaviours may have significantly contributed to the description of their story, particularly for PWA, who may have used non-verbal communication to facilitate successful information exchange. Therefore, field notes were taken during interviews and integrated into transcriptions.

The researcher was inextricably involved in the qualitative research process therefore it was not possible to remove the researcher and her context, knowledge, experiences and

assumptions. Measures were taken to minimise the impact of researcher bias and maintain the integrity of the data by recognising and acknowledging where potential researcher bias may have impacted on the data collection and analysis. Active journaling and reflection were conducted throughout the research process to identify and acknowledge potential sources of bias. These reflections were also discussed with the PhD supervisory team to aid this process and facilitate the first author's reflections.

The first author repeated and rephrased participant comments during the interviews and focus groups to confirm the data were representative of their opinions, experiences and perceptions. This was completed during data collection, rather than after data analysis, as participants may not have recognised their individual personal stories as a result of the breaking up and categorisation of data. Reading deficits are common in aphasia therefore returning transcripts for member checking may not have been accessible to this participant group. Additionally, participation in the interview and/or focus groups may have changed the participants' perspectives on the topics discussed.

4.7 Data Management

All data collected remained confidential. No identifying information was attached to the data and any information that may have revealed the participant's identity was removed. The master list of each participant's name and code was stored in a locked filing cabinet at the hospital site which was only accessible by the research team. All data were accessed, used and stored in accordance with Commonwealth Privacy Laws. The de-identified data were stored on a password-controlled computer or in a locked cabinet at Edith Cowan University. Electronic data were backed up on a password controlled hard drive only accessible by the first author.

The data collected from this study will have a significant contribution to the aphasia research area and therefore will be stored for 15 years following the completion of this study. After this time, data will be deleted from electronic storage and hard copy data will be shredded. Study participants provided consent for data to potentially be accessed for future studies by the study investigators or future higher degree by research (HDR) students. In the case of HDR use of the data, this will be bound by a two-way confidentiality agreement. The data may be used for teaching purposes only with the additional written permission from participants. The data may be made accessible to consumer groups and information may be made available through the Stroke Foundation and scientific journals. Confidentiality will be maintained in all circumstances.

Non-identifiable data will be accessible by researchers through data sharing archives. Researchers who access these data from the data bank will not have access to the participant keys that attach participants to codes, therefore data will only be re-identifiable by the author of this thesis. Data will be stored in the Edith Cowan University data storage repository. These data will be available in a de-identified format by request through the author of this thesis. The availability and use of the data are governed by Edith Cowan University Research Ethics.

4.8 Administration Procedures

4.8.1 Ethical Review Committee

All processes and documentation used within this study were reviewed and approved by the hospital Research Ethics Committee (HPH431) and Edith Cowan University Research Ethics Committee (ECU HREC 12149). The author of this thesis completed the annual ethics reports.

4.8.2 Informed Consent

Patients were excluded if they did not have adequate English proficiency to participate in semi-structured interviews as determined by the hospital medical team. This included patients that required an interpreter.

PWA were provided with aphasia friendly information sheets and consent forms with simple language, bold key words and pictorial support. This was read and explained by the author of this thesis. Supported conversation strategies were used to support and facilitate the involvement of PWA and their understanding of the research process, informed consent and their rights to withdraw at any time. This was provided by the author of this thesis who is a qualified speech pathologist with experience in communicating with PWA using supported conversation strategies for aphasia. All patients were informed that agreeing or declining to participate in this research would have no impact on the treatment and care they would receive during their hospital admission. A detailed information sheet was also provided to the 'person responsible' for all patients.

4.8.3 Protocol Amendments

All protocol amendments were reviewed and accepted by the hospital site research Ethics Committee and the Edith Cowan University Research Ethics Committee.

In response to peer review, an additional research question was included to ensure the focus of this study reflected the pilot nature of this work. Therefore, research question i. was added: 'can a CEE model be implemented in a hospital ward setting?'.

Two participants in the control group (PWA1 and PWOA1) had four days of observations (three hours per day on a Saturday, Sunday, Monday and Tuesday) rather than three days of observations (four hours per day). These participants had the same number of observations as the remaining participant cohort. The observations were changed from four days to three days to enable more efficient data collection on the wards. In addition, one observation period conducted on Christmas Eve was excluded from analysis for one participant in the intervention group (PWA7) as staffing levels and therapy provided were assessed as significantly different to the other observation periods.

Foreword to Chapter 5

Title of publication: Hospital staff, volunteers' and patients' perceptions of barriers and facilitators to communication following stroke in an acute and a rehabilitation private hospital ward: A qualitative description study.

Authors: D'Souza, S., Godecke, E., Ciccone, N., Hersh, D., Janssen, H., & Armstrong, E.

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Author contributions: SD, EG, NC, DH, HJ and EA designed the study and the protocol. EG reviewed the final copies of the study protocol documents [study protocol documents not included in this thesis]. SD conducted the semi-structured interviews and focus groups. SD performed data analyses. DH conducted the critical review of categories and themes. SD wrote this manuscript. SD, EG, NC, DH, HJ and EA contributed to the manuscript editing and approved the manuscript.

In order to develop and implement a Communication Enhanced Environment (CEE) model on the participating hospital wards it was important to first develop an understanding of the usual care environment. This chapter reports on the qualitative investigation of the before phase patients' (the control group) and hospital staff and volunteers' perspectives of barriers and facilitators to communication and engagement in language activity in the participating hospital wards. This before phase study provided a means to conduct implementation science investigations such as: a problem analysis; an assessment of the hospital organisation and individual staff readiness for change; an assessment of the barriers to knowledge use; and an analysis of the factors influencing the targeted behaviours. These results were used to inform the development of the CEE model as well as the implementation strategies utilised to promote the implementation and uptake of the CEE model in usual care.

Chapter 5. Control Group and Staff Qualitative Data

Abstract

Objectives: To explore barriers and facilitators to patient communication in an acute and a rehabilitation ward setting from the perspectives of hospital staff, volunteers and patients following stroke.

Design: A qualitative descriptive study as part of a larger study which aimed to develop and test a Communication Enhanced Environment model in an acute and a rehabilitation ward.

Setting: A metropolitan Australian private hospital.

Participants: Focus groups with acute and rehabilitation doctors, nurses, allied health staff and volunteers (n=51) and interviews with patients following stroke (n=7), including three with aphasia, were conducted.

Results: The key themes related to barriers and facilitators to communication, contained sub-categories related to hospital, staff and patient factors. Hospital related barriers to communication were: private rooms; mixed wards; the physical hospital environment; hospital policies; the power imbalance between staff and patients; and task specific communication. Staff related barriers to communication were: staff perception of time pressures; underutilisation of available resources; and staff individual factors such as personality, role perception and lack of knowledge and skills regarding communication strategies. The patient related barrier to communication involved patients' functional and medical status. Hospital related facilitators to communication were shared rooms/co-location of patients; visitors; and volunteers. Staff related facilitators to communication were: utilisation of resources; Speech Pathology support; staff knowledge and utilisation of communication strategies; and individual staff factors such as personality. No patient related facilitators to communication were reported by staff, volunteers or patients.

Conclusions: Barriers and facilitators to communication appeared to interconnect with potential to influence one another. This suggests communication access may vary between patients within the same setting. Practical changes may promote communication opportunities for patients in hospital early after stroke such as: access to areas for patient co-location as well as areas for privacy; encouraging visitors; enhancing patient autonomy; and providing communication-trained health staff and volunteers.

Study strengths:

- This study involved a large number of staff in comparison to previous studies and included volunteers as well patients following stroke with and without aphasia.
- Data saturation was reached within the staff focus groups.

Study limitations

- The results in this study reflect the perceptions of a small number of medical (n=2) and nursing staff (n= 11) compared to allied health staff (N= 32) which may be reflected in the results.
- This study involved exploring the perceptions a small number of patients; a broader range of perspectives may have been expressed with a larger number of participants.
- This study was conducted at a private hospital involving a mixed acute and a mixed rehabilitation ward, therefore these results reflect this context.

5.1 Background

Aphasia research supports the theory that commencing aphasia rehabilitation in the early phase post-stroke (<1-month post-stroke) results in better outcomes than therapy commenced in the chronic phase (>6-months post-stroke) (RELEASE Collaborators, 2021; Robey, 1998). However, patients in hospital following stroke spend on average 50-94% of their day inactive (Fazio et al., 2020; Kevdzija & Marquardt, 2021). Despite improvements in functional independence during their hospital admission following stroke, patients' engagement in cognitive and social activity remains largely unchanged (Janssen et al., 2014a). Patients with aphasia (PWA) spend two thirds less time engaged in social interactions with family and friends compared to those without aphasia (Godecke et al., 2014). A lack of social and cognitive activity early after stroke for PWA has the potential to contribute to: i) the development of maladaptive compensatory communication behaviours; and ii) the learnt non-use of language, which may ultimately impact on their quality of life and overall language recovery (Godecke et al., 2014).

Patients following stroke with and without aphasia have described time outside of therapy as "dead and wasted", reporting a lack of stimulation and inactivity in hospital impacting their ability to self-direct their rehabilitation outside of therapy (Eng et al., 2014, p. 4). They report the experience of boredom is worse in the evenings and weekends when there are less structured activities (Kenah et al., 2018). They also perceive boredom negatively influences their mood, motivation, and contributes to the experience of post-stroke fatigue (Kenah et al., 2018). Boredom is associated with a loss of autonomy and sense of control and contributes to patients becoming passive recipients of care, which may have negative implications for stroke recovery (Kenah et al., 2018).

This study aimed to explore hospital staff and volunteers', and patients' perceptions of barriers and facilitators to patient communication in an acute and a rehabilitation hospital ward. Identifying barriers and facilitators to patients' communication will inform the development of a Communication Enhanced Environment (CEE) model for the purposes of increasing their engagement in language activity within a hospital ward to maximise post-stroke aphasia language recovery.

5.2 Method

5.2.1 Design

This study was part of a larger study which aimed to develop and test a CEE model within an acute and a rehabilitation ward (see supplementary file for study protocol and procedure [study protocol not included in this thesis, see Chapter 4 for methodological framework]). This study contributed to the before phase of the larger study outlined below:

- i) Before phase: observe and quantify levels of engagement in language activity in the acute and rehabilitation ward environment for patients following stroke, and explore hospital staff and volunteers', and patients' perceptions of barriers and facilitators to communication in hospital.
- ii) Implementation phase: develop and implement the CEE model on the acute and rehabilitation wards.
- iii) After phase: assess the impact of the CEE model on patient engagement in language activity, and hospital staff, volunteers' and patients' perceptions of barriers to communication in hospital, and explore staff experiences of the implementation and use of the CEE model.

5.2.2 Ethical Approval

This study has Ethics approval from The Hollywood Private Hospital Research Ethics Committee (HPH431) and the Edith Cowan University Human Research Ethics Committee (ECU HREC 12149).

5.2.3 Reporting Guidelines

The consolidated criteria for reporting qualitative studies (COREQ; Tong et al., 2007) was used to guide reporting this study (Appendix A).

5.2.4 Research Author's Relationship with Participants

The first author who was external to the hospital conducted focus groups and interviews. The first author engaged key hospital team members for the duration of the study to inform the study design to ensure it aligned with the hospital policies and priorities.

5.2.5 Public and Patient Involvement

The public and patients were not involved in the design of this study however these data informed the development of the CEE model in the larger study. A working group consisting of key members of the stroke multidisciplinary team were provided feedback on this study's findings and were involved in the development of the CEE model and embedding approach, which was based on the outcomes of this study.

5.2.6 Setting

This study was conducted in an acute and a rehabilitation ward at a private hospital in Perth, Western Australia. The acute ward was a 26-bed unit with patients following acute stroke as well as other medical conditions. The acute ward had four individual rooms and nine shared rooms, two rooms with four beds per room, and seven rooms with two beds per room. Patients ate meals in their rooms and had access to an outdoor balcony area. The rehabilitation ward was a 44-bed mixed rehabilitation unit for patients following stroke and other medical, orthopaedic and post-surgical conditions. There were 36 individual rooms, and four shared rooms with two beds in each room. Patients had breakfast in their rooms but were encouraged to eat lunch and dinner in one of two communal dining areas.

5.2.7 Participants

Hospital staff participants. Purposeful sampling of acute and rehabilitation hospital staff was conducted to include at least one representative from each acute and rehabilitation staff group including medical, nursing, volunteers, and allied health staff members who were over 18 years of age. The first author obtained formal consent from all participants in the study. A total of 51 staff and volunteers were recruited (Table 2) by contacting staff department managers who identified staff currently working or had previously worked with patients on the acute or rehabilitation wards.

Table 2.*Staff Participants*

| Staff and volunteer groups | | | | | |
|--------------------------------|---|---------------------------------------|---|----------------|---|
| Medical & Nursing | N | Allied Health | N | Volunteer | N |
| Acute nurses (AcuteN) | 2 | Dietitian (DT) | 1 | Volunteers (V) | 6 |
| Clinical nurse manager (CNM) | 1 | Occupational Therapy manager (OTM) | 1 | | |
| Medical consultants (MedC) | 2 | Occupational therapists (OT) | 5 | | |
| Rehabilitation nurses (RehabN) | 8 | Occupational Therapy assistants (OTA) | 3 | | |
| | | Physiotherapists (PT) | 8 | | |
| | | Physiotherapy assistants (PTA) | 2 | | |
| | | Social workers (SW) | 5 | | |
| | | Speech Pathology manager (SPM) | 1 | | |
| | | Speech pathologists (SP) | 4 | | |
| | | Speech Pathology assistant (SPA) | 1 | | |
| | | Volunteer manager (VM) | 1 | | |

Patient participants. All consecutively admitted patients following stroke from January to February 2016, and June 2016 to July 2017 were screened for eligibility by the hospital site champions to participate in the study. Inclusion criteria: i) admitted to the acute or rehabilitation ward with an acute stroke; ii) less than 21 days post-stroke during data collection; iii) able to provide informed consent based on the judgement of the medical team responsible for the medical management of the patient; iv) Glasgow Coma Scale (Teasdale & Jennett, 1974) greater than 10; v) estimated total length of hospital stay greater

than 14 days; vi) adequate English proficiency to participate in interviews as determined by the medical team. Exclusion criteria: i) uncorrected hearing or vision (for example hearing impairment without the use of hearing aids or vision impairment without the use of glasses); ii) medically unstable; iii) documented diagnosis of current untreated depression; iv) documented diagnosis of dementia, previous aphasia or traumatic brain injury. The diagnosis of aphasia was confirmed for those who achieved a Western Aphasia Battery-Revised (Kertesz, 2006) Aphasia Quotient score less than 93.7. Eligible patients were approached by the site champions for consent to be approached by the research team. The first author completed formal consent with all patient participants. A total of nine patients were recruited, however two patients were withdrawn as they became medically unwell. Data collection was completed for four patients without aphasia (PWOA) and three PWA. See Figure 2 for the summary of patient screening and recruitment. Patient details and demographics are detailed in Table 3.

No staff or patients withdrew from participating in this study.

Figure 2.

Summary of Patient Screening and Recruitment

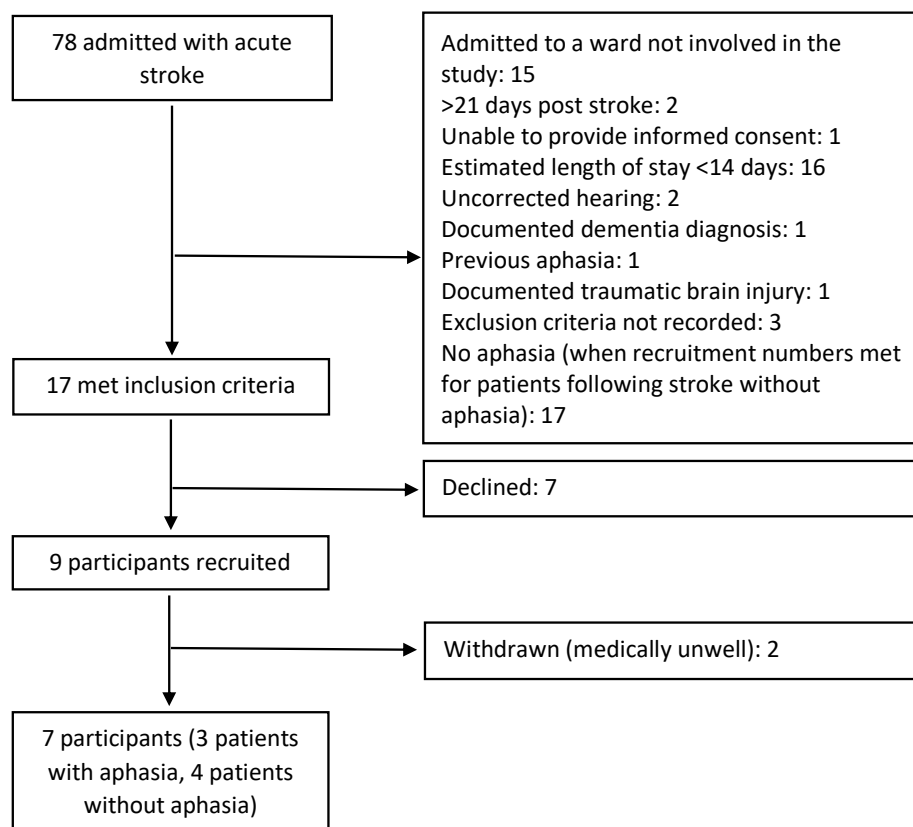


Table 3.*Patient Details and Demographics*

| | Group (n=7) | PWA (n = 3) | PWOA (n = 4) |
|---|----------------|----------------|-----------------|
| Participants | | | |
| Age (yr), median (range) | 78 (76-93) | 78 (78-87) | 83 (76-93) |
| Sex, n females | 4 | 1 | 3 |
| Pre-morbid mobility, n needing aids | 1 | 1 | 0 |
| Pre-morbid living arrangement, n alone | 3 | 1 | 2 |
| Time since stroke (d), mean (SD) | 14 (5) | 13 (7) | 15 (5) |
| Stroke severity (NIHSS 0-42), mean (SD) | 4 (3) | 5 (4) | 5 (3) |
| Mild, n score < 8 | 5 | 2 | 3 |
| Moderate, n score 8-15 | 2 | 1 | 1 |
| Severe, n score > 15 | 0 | 0 | 0 |
| Mobility status at time of data collection | | | |
| Independent +/- walking aid | 1 | 0 | 1 |
| Stand-by assistance | 3 | 1 | 2 |
| 1-2 person assistance | 2 | 1 | 1 |
| Hoist/wheelchair | 1 | 1 | 0 |
| Cognition (MoCA), median (range) | 18 (9-22) | 16 (9-18) | 20 (17-22) |
| Aphasia severity, WAB-R AQ mean, (SD) | | 77 (6.50) | |
| Ward (d) | | | |
| Acute (%) | 4 (17) | 4 (40) | 0 (0) |
| Rehabilitation (%) | 19 (83) | 6 (60) | 13 (100) |
| Average number of days in single room per participant (%) | 3.1 (96) | 3 (90) | 3.3 (100) |

Notes: PWA= patient with aphasia; PWOA= patient without aphasia; NIHSS=National Institute of Health Stroke Scale (National Institute of Neurological Disorders and Stroke, 2011); MoCA= Montreal Cognitive Assessment (Nasreddine et al., 2005); WABAQ=Western Aphasia Battery-Revised (Kertesz, 2006) Aphasia Quotient score.

5.2.8 Data Collection

The first author, a female speech pathologist (Bachelor of Speech Pathology, Honours) and PhD student with four years clinical experience working in the hospital setting and five years research experience, including conducting interviews and focus groups,

completed all semi-structured interviews and focus groups. Staff were informed that the researchers wanted to investigate their perceptions of the hospital ward environment with regard to communication opportunities to inform the development of a CEE model. Patients were informed that the researchers wanted to explore how the hospital environment influenced patient activity.

All interviews and focus groups were conducted using interview and focus group guides (staff focus groups and interview guide, Appendix B; patient interview guide, Appendix C) and were audio recorded. Field notes were completed by the first author during data collection. Seven staff focus groups were conducted with two to eight participants in each focus group. One-on-one interviews were conducted with two staff members. All staff focus groups were completed on the hospital site in various locations that were private and quiet. Six out of seven patient interviews were conducted in person during their in-patient admission in their hospital room, and one was completed over the phone (PWOA) one day following discharge from hospital. All patient interviews were conducted within fifteen days post-stroke. Interview and focus groups were 20-60 minutes long, often varying based on the number of participants in the focus groups. Supported conversation strategies (Kagan, 1998) were used during interviews with PWA to facilitate their participation in the interview. One PWA had two family members present during the interview. During the interviews and focus groups, clarifying questions and paraphrasing participant comments were used to confirm and clarify their perspectives and insights.

5.2.9 Data Analysis

Focus groups and interviews were transcribed verbatim. Responses to any leading questions were removed from the data set (Milne & Oberle, 2005).

The theoretical framework for this research was a qualitative description approach (Neergaard et al., 2009). This approach involved describing patient experiences, with minimal interpretation of the data to minimise the potential bias of the researchers (Neergaard et al., 2009). Participant experiences were analysed using NVivo (2018) computer software to manage the data. Data were grouped into themes according to content (Milne & Oberle, 2005). The first level of coding identified the broad content of the data then sub-categories were identified (Milne & Oberle, 2005). Single lines of data were not removed from their 'story' during data analyses to maintain the context and help ensure

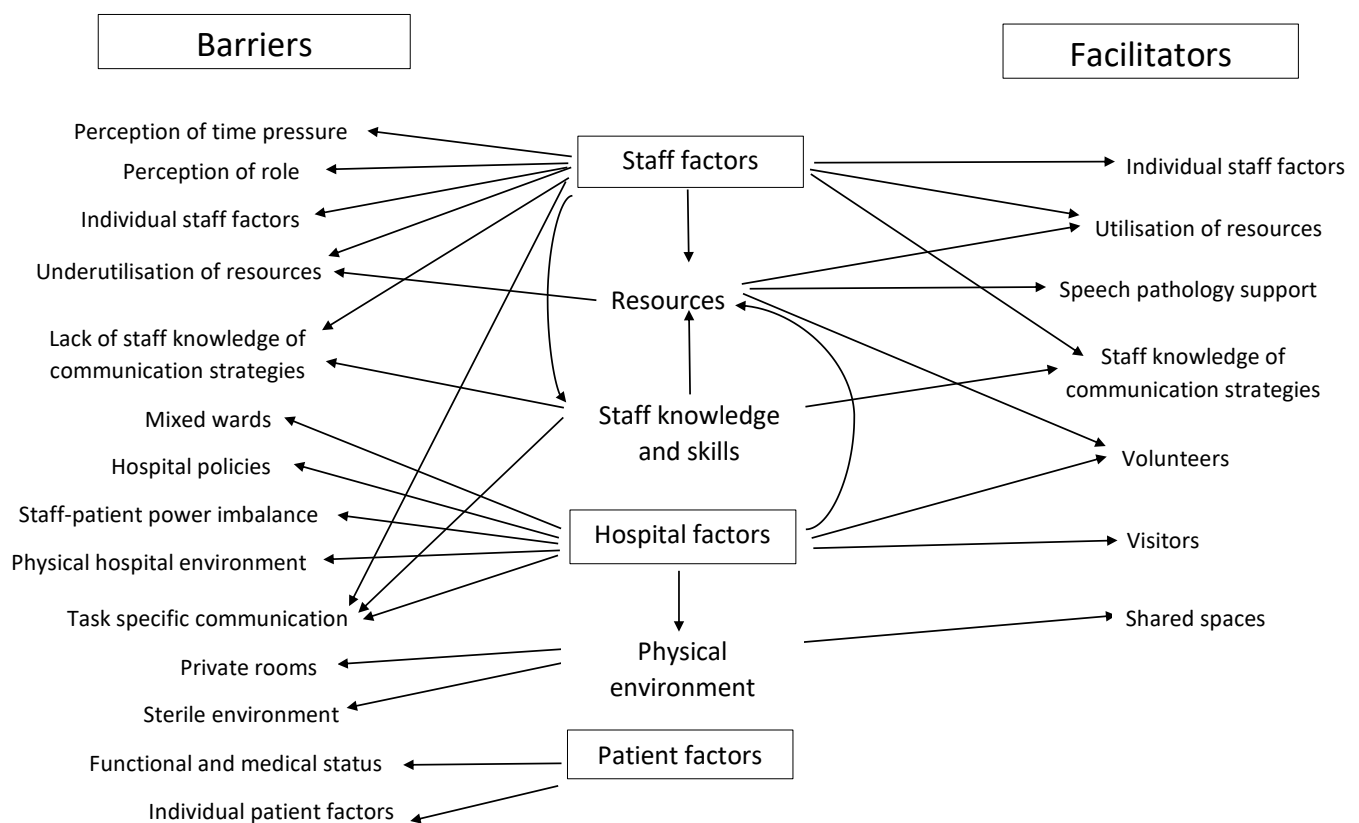
meaning was not lost or misinterpreted (Milne & Oberle, 2005). Ongoing critical review of the categories were conducted, and themes were reviewed by a second researcher (Neergaard et al., 2009). Staff were provided feedback on the findings.

5.3 Results

The key themes from the focus group and interviews related to barriers and facilitators to communication, with sub-categories identified which related to hospital, staff and patient factors (Figure 3).

Figure 3.

Summary of Themes and Sub-themes of Staff and Patient Perceptions to Barriers and Facilitators to Patient Communication in Hospital



BARRIERS TO COMMUNICATION

Hospital related factors (barriers to communication)

Private rooms reduce opportunities for social interaction

Staff and patients described the impact of single rooms which limited incidental socialisation with other patients and their visitors.

We used to co-locate our stroke patients [sic] and often using our shared rooms.

That's when people had more opportunities for interacting with one another. (MC1)

Mixed wards affect staff acquisition of specialist skills

Staff described their perception of the negative effect a mixed hospital ward had on the acquisition of stroke specific specialist skills.

Having a stroke specific ward... everybody on the ward would be trained... and that's the only thing they'd have to focus on rather than having lots of other patients with lots of medical conditions. (OT4)

Hospital environment does not encourage socialising

Staff talked about the physical hospital ward environment affecting social interaction as it contributed to a sterile atmosphere rather than one that promoted social activity. Staff also talked about the consequence of background noise and environmental distractors in large, shared rooms on the acute ward which reduced their ability to communicate with patients with communication impairments.

My general feeling of rehab [rehabilitation] is that they come to their sessions and then they go back to their lonely dark room... I don't really see the rooms as a particularly happy, busy place where they are getting a lot out of being in there... the dining rooms... they're not a particularly pleasant place to be either. (PT2)

They [patients] can hear other people talking... there is [sic] a lot of voices going on which is going to impact on their understanding as well. (PT3)

Hospital policies restrict the development of communication-promoting ideas and initiatives

Hospital policies were perceived by staff as a barrier to communication, negatively influencing their ability to develop ideas and initiatives to increase patients' opportunities for social interaction. This included policies regarding leaving patients unattended in dining areas without patient care assistants supervising them and requiring nurses to supervise patients if they are eating; and reported limitations around food related activities as a result of food hygiene policies and occupational health and safety.

It's just every time you try and do something you hit a barrier... you do try and think outside the box, what more can you do for this patient, and you get another hospital rule. (PT2)

Power imbalance of staff and patients in hospital controls patients' ability to access communication opportunities

Staff and patients discussed the influence of the power imbalance for patients in hospital, and patient perceptions that they have to do what is expected in the hospital environment. This appeared to limit patients' ability to freely engage and explore the environment resulting in patients retreating to their rooms and limiting their opportunities to engage in activities.

I think most males like to account for their time um and I felt like I haven't been able to do that and that's, that's the bit that I'm really, really lacking. (PWA2)

I was in the hospital, so I think I had to stick into the room, to the rules. (PWOA2)

Very often when you're in a hospital you do what you think you're expected to do. (SP4)

Task specific communication reduces patients' communication opportunities

Staff talked about the nature of interactions with patients as often being driven by the patient's care, restricting opportunities for communication beyond this context.

I know we aim to be very holistic... but very often care is very[sic] directed from a medical health care perspective. (SP4)

Staff related factors (barriers to communication)

Staff perception of time pressures limiting opportunities for communication

Both patients and staff perceived staff time pressures as a barrier negatively affecting communication on the wards. This may be the reflection of actual time pressures, or staff perceptions of their available time. Some staff reported that they felt interactions with patients with communication impairments required extra time which was challenging in a time pressured hospital environment. Time pressures were also perceived to restrict staff ability to facilitate opportunities for patients to socialise with other patients. For example, nurses appeared to deprioritise transferring patients to the communal area for lunch in busier times.

If they're hoist patients [sic] it might not be as easy for staff to get them to the dining room, that wouldn't totally prevent someone from going, it would just depend on the time that people had on the day. (SW3)

Staff and patients' underutilisation of available resources

Staff described the lack of accessible resources as a factor negatively affecting staff-patient communication. They described the need for resources when communicating with patients with aphasia and other communication impairments. They also described a number of resources that they felt patients were not aware of and therefore did not utilise such as volunteer services that promote communication opportunities and facilitate patient access to outdoor areas.

I feel like I don't know where else to go. I don't know if other things that [sic] could help us, maybe there's things out there that I don't know about that would help us communicate with these patients. (PT2)

There are all of these opportunities but I don't think a lot of the patients access them, so it sounds like great communicative opportunities for them but the reality is that a lot of them are sitting in their rooms most of the times by themselves watching television and most of the interactions they have is with the nurses or just whoever comes in to see them. (SP4)

Individual staff factors leading to restricted opportunities for communication

Staff described individual staff factors such as personality, values and attitudes influencing communication opportunities for patients, such as staff providing patients with opportunities for incidental social interaction during routine tasks.

Often if people need to go in and see the patient let's just say to take obs [observations] or to do a wash... they don't always use that opportunity as an opportunity to chat... there could be more opportunity to chat at those times whilst they are doing what they need to get done and you know that varies from person to person, personality as well and how busy people are, what else is going on. (SP3)

Staff perception their role does not include communication tasks

One staff perceived communication as a task separate from the responsibility of their role therefore limiting their facilitation of communication opportunities for patients.

They [speech pathologists] do their bit and we do ours... we don't have time to practise speech with them because we really do have to get all of our jobs filled in the time and it's specifically rostered for us to do our work, not to help with someone else's. (RehabN1)

Lack of staff knowledge and skills resulting in unsuccessful communication interactions or avoiding communication interactions

Staff described a lack of knowledge and skills in communicating with patients with communication impairments. Some staff reported feeling anxious about encouraging patients to communicate as communication breakdowns may cause stress and anxiety for the patient, and the staff member. Staff reported a lack of confidence in their ability to repair communication breakdowns which resulted in increased time pressures in their sessions, often leading them to avoid encouraging communication interactions within their treatment sessions.

I find it challenging... knowing how the best way to communicate with that person [with aphasia] ... then [they] become very frustrated and not have the tools themselves to communicate back to me and you would never want to leave someone in that space. So that's something that I struggle with. (SW2)

Patient-related factors (barriers to communication)

Patient related factors reflected their functional and medical status, personality, mood and motivation, which were perceived by staff and patients to often act as a barrier to engaging in communication interactions during their hospital admission early after stroke.

Patients' functional and medical status limiting their ability to seek out and engage in activities

Staff and patients perceived patients' medical status as a barrier to communication by limiting their ability to engage with their environment including independently seeking out activities and being able to use communal areas.

If someone is bed bound (sic), you know the interaction is very minimal... you often walk past and you see them alone in their room... you wonder what happens during those periods of time where they're just in their room and they don't have family. (OT2)

Well, I can't do anything cos (sic) I can't go off by myself and do anything. (PWOA2)

Individual patient factors limiting opportunities for communication

Staff described individual patient factors such as personality, mood and motivation influencing communication opportunities for patients such as independent practise of communication therapy tasks, and social opportunities with patients and hospital staff.

We have to recognise some patients who have had strokes ... they're fed up with having people poking and prodding them, then have a volunteer and go "do you want to do your exercises for speech?" (VM)

They need a break after OT [the occupational therapist] has done a shower. If they don't get that break then the physio [Physiotherapy] isn't going to be as good for them because they're so tired, so we also have to look at break times in between each session... (OTA1)

FACILITATORS TO COMMUNICATION

Hospital-related factors (facilitators to communication)

Shared rooms/co-location encourages incidental social interactions

Staff talked about use of communal areas at other hospitals which facilitated socialisation and communication during non-therapy times and during group therapy. Staff described the importance of the use of communal areas given the large number of private rooms on the ward. Patients also described the need to be co-located to promote social interaction.

I think that, put the [sic] whole lot of people together and ah and they [sic] something collective, that's what human beings are put together for ... sitting around talking... over the proverbial cuppa. (PWA2)

Visitors provide patients opportunities for socialisation

Staff identified visitors as a facilitator to communication interaction for patients outside of therapy times during their in-patient admission.

Interaction with the family... it's not therapy based but it's their [patients'] opportunity to practise. (PT1)

Volunteers facilitate opportunities for patients to engage in social activities

Staff discussed the benefit of volunteers in facilitating opportunities for patients to engage in social interactions including programs involving therapy dogs, book loaning, hand massages, and taking patients off the ward.

If we see people that are lonely, are not getting visitors, there's many volunteers... to go and visit them and if they're well enough they can take them out... the volunteers, we do rely on them. (OTA1)

Staff-related factors (facilitators to communication)

Staff utilisation of resources promote communication exchange

Staff identified access to resources such as chat books and alternative and augmentative communication boards often facilitated communication interactions with patients with communication impairments on the ward.

Sometimes with the ... signs... "do you want to drink? some water?" or something, so they can just point because ... they want to say something and maybe the right words are not coming out... that also helps. (RehabN3)

Speech Pathology support and education facilitates staff use of communication promoting strategies

Staff reported support and education from Speech Pathology staff facilitated their ability to interact successfully with PWA.

I had a patient who had word finding difficulties... I just was observing the speechie [speech pathologist], she would just be like "no, what do you mean?" and he'll be like [pointing] and she'll be like "tell me, what's the word?" ... it's something I could have just added to my session. (PT4)

Staff knowledge and utilisation of communication strategies promotes communication activities

Staff and volunteers discussed the use of communication strategies and resources to facilitate communication on the ward for patients with a variety of communication impairments.

We use communication boards, pictures, writing things down, talking slowly.
(MedC2)

If they are having trouble, I will say to them “it’s okay you don’t need to hurry, that’s fine”. (V1)

Individual staff factors promote communication opportunities for patients

Staff and patients talked about how individual characteristics of staff, including rapport building and being friendly, facilitated communication for patients with communication difficulties.

Sometimes they [patients] look for that specific person... the more they get confident, the more they get relaxed, the more their speech enhances as well.
(RehabN3)

5.4 Discussion

This study aimed to explore hospital staff, volunteers and patients’ perceptions of barriers and facilitators to communication in an acute and a rehabilitation ward. A wide range of factors were perceived to act as potential barriers or facilitators to communication. Additionally, a number of factors influencing patient access to communication opportunities appeared to influence one another.

The co-location of patients in therapy spaces, dining areas or in shared rooms were perceived as facilitators to communication for patients, providing opportunities for incidental social interactions with other patients and their visitors. However, background noise in these shared spaces was also perceived to act as a barrier to their ability to engage

in communication. Patient access to communal spaces was influenced by a number of factors including patients' sense of autonomy to freely explore the hospital ward environment, and their medical and mobility status, and staff perception of their available time, which influenced whether they transferred patients to these spaces. Rosbergen et al., (2017b) reported that in an acute stroke ward enriched environment communal mealtimes and group activities were perceived to facilitate social activity. The study by Rosbergen et al. (2017b) found that staff reported perceptions that shared rooms limited staff and patients' ability to engage in private conversations, consistent with O'Halloran et al.'s (2012) findings. It may be that access to both private and communal spaces within the hospital environment play critical roles with regard to providing opportunities for social interactions with other patients and their visitors, and opportunities for privacy when required.

The acute and rehabilitation wards had a large proportion of single rooms, which could have been the result of this study being conducted at a private hospital. However, there has been a perceived trend towards increased proportions of single rooms in newly built public hospitals to promote infection control and patient privacy which may have a detrimental effect on communication (Ana°ker et al., 2017; Shannon et al., 2018). The predominance of single rooms and limited opportunities to access shared spaces may have increased the effect of other barriers on communication opportunities for patients. For example, a patient with poor autonomy may be more likely to remain alone in their single room when they are not attending therapy, as they perceive they are not 'allowed' to freely explore the hospital environment. This may reduce the likelihood of the individual independently seeking out social interactions beyond their room. If they also have reduced mobility, they may be more reliant on staff to facilitate transfers to communal spaces which may be impacted by staff time constraints. The patient's functional status and levels of fatigue may also limit their ability to initiate and engage in activities while they are in their room. Therefore, the combined effect of these barriers may significantly limit this patient's communication opportunities.

These communication barriers may be mitigated by having scheduled rest periods, and periods allocated to encouraging visitors to provide opportunities for communication and socialisation within their room, and facilitate patient access to shared spaces, such as helping mobilise wheelchair users into communal dining areas, and education to patients that they are allowed to explore the hospital ward environment. Rosbergen et al., (2017b)

identified patient and family autonomy to initiate and direct activity as a factor enriching the acute ward environment. Therefore, increasing patient autonomy within this setting may facilitate their ability to seek out interactions within the environment and increase engagement in communication activity, which may then reduce the effect of being in a single room with reduced mobility and time poor staff.

A potential lack of opportunities to access social interactions with other patients means staff, including volunteers, and visitors may become the main communication partner for patients. Godecke et al.'s (2014) observation study found that nurses are the most frequent communication partner for PWA following stroke, after their family members, therefore patient-staff interactions may play a significant role for those patients with minimal or no visitors. It is interesting to note that this study recruited a limited number of acute nurses in comparison to rehabilitation nurses. This could be interpreted as a reflection of differences in nurses' capacity for additional activities within the demands and time restrictions of the acute ward context in comparison to the rehabilitation ward context. Within the current study, communication between staff and patients appeared to be dependent on a number of factors including: staff perception of their role; their knowledge and skills in facilitating communication; their values and attitudes towards communication and whether supporting language and communication for PWA is perceived to be part of their 'role'; their willingness to be flexible with their time; and their knowledge of and access to resources which may be used to facilitate communication. This also highlights the potential impact of the perceived power imbalance between staff and patients and the significance of interactions that are task directed. Hersh et al. (2016) reported PWA felt disempowered in communicative interactions with nurses, where nurses tended to talk to the task and controlled the interactions. This highlights the need for communication partner training which may provide staff with the knowledge and skills required to support effective communication with PWA (Simmons-Mackie et al., 2010). Implementation strategies will need to be considered to promote behaviour change as well as the uptake and maintenance of training including involvement of management and ward champions, and ensuring trained communication strategies are easy to learn, apply and audit in order to be applicable in this busy context (Shrubsole et al., 2019).

Time pressure was perceived as a major barrier to communication impacting on staff ability to support successful communication within their interactions with patients and

facilitate patients' opportunities to engage in interactions in social or communal areas. Time constraints have been reported to limit communicative opportunities between patients following stroke and nurses (Ball et al., 2014). Ball et al. (2014) found that 86% of surveyed nurses reported one or more activities had been "left undone" in their last shift as a result of lack of time. The study found that activities most likely to be missed by nurses as a result of time constraints were comforting and talking to patients (66%) and patient education (52%). This has also been identified by patients who "did not like to bother the busy nurse" (McCabe, 2004, p. 44). Time limitations and pressures on the wards may be facilitated by developing staff knowledge of and skills in using communication promoting strategies. Effective and efficient nurse-patient communication as a result of nurse training has been found to save time, reduce frustration and reduce the burden associated with caring for PWA (McGilton et al., 2009). Additionally, time limitations reported by staff may lend to an argument for additional nursing allocation for patients with communication impairments.

This study included a small number of medical and nursing staff in comparison to compared to allied health staff which may be reflected in the reported results. This study also involved a small number of patients, and a broader range of perspectives may have been expressed with a larger number of participants. This study was conducted at a private hospital involving a mixed acute and a mixed rehabilitation ward, and a relatively homogenous group of participants linguistically and ethnically, therefore these results reflect this context and may not be directly generalisable to hospitals in the public sector, nor did they explore cultural factors contributing to communication.

5.5 Conclusion

The barriers and facilitators to communication appear to be interconnected and likely to influence one another, suggesting that the level of communication access may vary from patient to patient within the same setting. Results of this study highlight a number of practical changes that could be implemented to promote communication opportunities for patients admitted to hospital early after stroke. However, implementation of behaviour and cultural change strategies may be pertinent to promote meaningful and sustainable change within the hospital setting. Consideration of areas for co-location for patients such as therapy spaces, dining areas or shared rooms as well as access to private spaces may

potentially address the need for social opportunities with other patients as well as access to privacy when required. The promotion of visitors attending the wards may facilitate communication opportunities for patients between therapy times by providing socialisation in patients' rooms as well as facilitating and advocating for patient access to communal areas. This has the potential to mitigate the effects of social isolation in single rooms, staff time constraints and limitations as a result of patients' medical status early after stroke. Strategies to promote patient autonomy in hospital may promote their ability to freely explore the environment beyond their room may help address the power imbalance that can occur between patients and hospital staff. Additionally, health staff and volunteer education in using communication promoting strategies may increase opportunities for interactions between patients, and staff or volunteers and promote communication exchange within those interactions. These factors will be explored in a CEE model, which aims to increase patients' opportunities to engage in language activities during early stroke recovery in hospital.

5.6 Acknowledgements

The authors would like to thank the hospital and staff for supporting this study and assisting in participant recruitment. We would also like to thank all the participants in this study for sharing their experiences and insights.

5.7 Competing Interests Statement

This research was funded by The Hollywood Private Hospital Research Grant (RF087). SD received an Australian Post Graduate Award Scholarship for the first year of this study and received an ECU Research Travel Grant. The authors have no other competing interests to declare.

5.8 Funding Statement

This work was supported by the Hollywood Private Hospital Research Foundation grant number RF087. SD received an Australian Post Graduate Award Scholarship for the first year of this study and received an ECU Research Travel Grant.

5.9 Data Sharing Statement

Data are available upon reasonable request. Patient interview and staff focus group data are stored in the Edith Cowan University data storage repository. These data will be available in a de-identified format by request through the first author ORCID <https://orcid.org/0000-0001-6221-3229>. The availability and use of the data are governed by Edith Cowan University Research Ethics.

Appendix A

Consolidated criteria for reporting qualitative studies (COREQ; Tong et al., 2007): 32-item checklist

| Guide questions/description | | Location in manuscript |
|---|--|------------------------|
| Domain 1: Research team and reflexivity | | |
| Personal Characteristics | | |
| 1. Interviewer/facilitator | Which author/s conducted the interview or focus group? | Page 80 |
| 2. Credentials | What were the researcher's credentials? E.g., PhD, MD | Page 80 |
| 3. Occupation | What was their occupation at the time of the study? | Page 80 |
| 4. Gender | Was the researcher male or female? | Page 80 |
| 5. Experience and training | What experience or training did the researcher have? | Page 80 |
| Relationship with participants | | |
| 6. Relationship established | Was a relationship established prior to study commencement? | Page 76 |
| 7. Participant knowledge of the interviewer | What did the participants know about the researcher? E.g., personal goals, reasons for doing the research | Page 81 |
| 8. Interviewer characteristics | What characteristics were reported about the interviewer/facilitator? E.g., Bias, assumptions, reasons and interests in the research topic | Page 76; 80; 80-81 |
| Domain 2: Study design | | |
| Theoretical framework | | |

| | | |
|--|---|-------------------|
| 9. Methodological orientation and Theory | What methodological orientation was stated to underpin the study? E.g., grounded theory, discourse analysis, ethnography, phenomenology, content analysis | Page 81 |
| Participant selection | | |
| 10. Sampling | How were participants selected? E.g., purposive, convenience, consecutive, snowball | Page 77-79 |
| 11. Method of approach | How were participants approached? E.g., face-to-face, telephone, mail, email | Page 77-79 |
| 12. Sample size | How many participants were in the study? | Page 77-79 |
| 13. Non-participation | How many people refused to participate or dropped out? Reasons? | Figure 2, page 79 |
| Setting | | |
| 14. Setting | Setting of data collection. Where was the data collected? E.g., home, clinic, workplace | Page 80-81 |
| 15. Presence of non-participants | Was anyone else present besides the participants and researchers? | Page 81 |
| 16. Description of sample | What are the important characteristics of the sample? E.g., demographic data, date | Table 3, page 80 |
| Data collection | | |

| | | |
|------------------------------------|---|------------------------|
| 17. Interview guide | Were questions, prompts, guides provided by the authors? Was it pilot tested? | Appendix B; Appendix C |
| 18. Repeat interviews | Were repeat interviews carried out? If yes, how many? | - |
| 19. Audio/visual recording | Did the research use audio or visual recording to collect the data? | Page 81 |
| 20. Field notes | Were field notes made during and/or after the interview or focus group? | Page 81 |
| 21. Duration | What was the duration of the interviews or focus group? | Page 81 |
| 22. Data saturation | Was data saturation discussed? | Page 74 |
| 23. Transcripts returned | Were transcripts returned to participants for comment and/or correction? | No |
| Domain 3: Analysis and findings | | |
| Data analysis | | |
| 24. Number of data coders | How many data coders coded the data? | Page 82 |
| 25. Description of the coding tree | Did authors provide a description of the coding tree? | Figure 3, page 82 |
| 26. Derivation of themes | Were themes identified in advance or derived from the data? | Page 81 |
| 27. Software | What software, if applicable, was used to manage the data? | Page 81 |
| 28. Participant checking | Did participants provide feedback on the findings? | Page 82 |
| Reporting | | |

| | | |
|----------------------------------|---|-------------------------------|
| 29. Quotations presented | Were participant quotations presented to illustrate the themes/ findings? Was each quotation identified? E.g., participant number | Page 83-90 |
| 30. Data and findings consistent | Was there consistency between the data presented and the findings? | Page 83-90 |
| 31. Clarity of major themes | Were major themes clearly presented in the findings? | Figure 3, page 82; page 83-90 |
| 32. Clarity of minor themes | Is there a description of diverse cases or discussion of minor themes? | Page 83-90 |

Appendix B

Before phase staff focus group guide

What kind of language activities or language tasks do patients following stroke currently participate in on the ward?

What kind of language activities or language tasks would you like see patients following stroke have access to on the wards?

Describe your experience of communicating with patients following stroke at the moment.

Can you tell me about anything that facilitates your ability to communicate with patients following stroke on the ward?

Can you tell me about any barriers you experience that impact your ability to communicate with patients following stroke on the ward?

What changes would you like to see to enhance communication between staff and patients following stroke on the ward?

What changes would you like to see to enhance communication between visitors and patients following stroke on the ward?

How could we enhance or optimise communication and language tasks and activities for patients following stroke on the ward?

What do you think a communication and language enhanced stroke ward environment might look like?

Appendix C

Control group patient interview guide

Tell me about what kind of activities you do while you are here (in hospital).

Describe your experience of communicating with people on the ward.

What makes it easier to communicate with people on the ward?

What makes it hard to communicate with people on the ward?

What can we do to make communicating with people easier?

Foreword to Chapter 6

Title of publication: Investigation of the implementation of a Communication Enhanced Environment model in an acute and a rehabilitation ward: A before-and-after pilot study.

Authors: D'Souza, S., Godecke, E., Ciccone, N., Hersh, D., Armstrong, E., Tucak, C., & Janssen, H.

Author contributions: All authors designed the study and the protocol. SD led the development of the Communication Enhanced Environment (CEE) model. EG and CT contributed to the development of the CEE model in the CEE model working party meetings. SD led the implementation of the CEE model. SD conducted participant recruitment, participant observations and data analyses. SD wrote this manuscript. HJ worked with SD in the development of the final version of this manuscript. All authors contributed to editing and approved the final manuscript.

This article is under second review for Clinical Rehabilitation.

This publication reports on the results of research questions i) 'can a CEE model be implemented in a hospital ward setting?' and ii) 'does a CEE model influence the amount of time patients following stroke spend engaging in language activities?'. This publication also details how implementation science principles informed the design of this study and the behaviour change taxonomy (see Appendix D) that informed this study's implementation strategies to promote the uptake of the CEE model in usual care.

Chapter 6. Research Questions i. and ii. Results: Control and Intervention Group Quantitative Data

Abstract

Chapter 6 has been published and is available as:

D'Souza, S., Godecke, E., Ciccone, N., Hersh, D., Armstrong, E., Tucak, C., & Janssen, H. (2021). Investigation of the implementation of a communication enhanced environment model on an acute/slow stream rehabilitation and a rehabilitation ward: A before-and-after pilot study. *Clinical Rehabilitation*. Advance online publication. <https://doi.org/10.1177/02692155211032655>

The green open access version of the article will be available at
<https://ro.ecu.edu.au/ecuworkspost2013/11554/>

Chapter 7. Additional Results

This chapter provides post-hoc analyses of control and intervention group quantitative observation data not included in the previous published chapter. These data report the influence of the presence of aphasia on patient activity levels, differences between groups in patient engagement in solitary language activities and interactive language activities, and the proportion of time patients spent watching television before-and-after implementing the CEE model. This is also analysed in relation to patient mobility status. This chapter reports results from the post-training questionnaire staff and volunteers completed after attending the CEE model and aphasia communication partner training session. This survey aimed to gain feedback to inform the future development of the training program.

7.1 Control and Intervention Group Quantitative Post Hoc Analyses

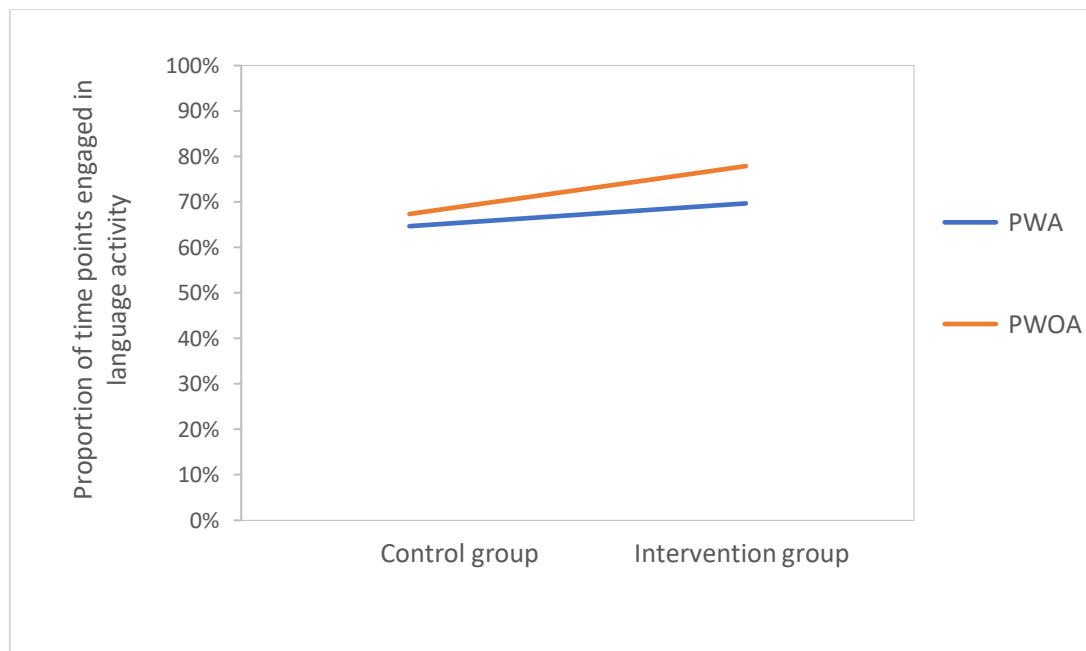
In order to further explore the data beyond the specific research questions, post-hoc analyses of control and intervention group patient observation data were conducted. A two-way ANOVA was used to determine the effect of aphasia on control and intervention group patient engagement in language activity (solitary and interactive), solitary language activity alone, and interactive language activity alone. A solitary activity was defined as a functional or non-functional/non-propositional language task which could be completed alone (i.e., reading, writing, listening to the radio, singing or using language apps on an electronic tablet). An interactive activity was defined as an exchange of information with a communication partner present in person, virtually or via the phone (i.e., talking, gesture and/or facial expression, reading, writing or drawing to communicate). A one-way ANOVA was used to compare the proportion of time control and intervention group patients spent watching television before-and-after implementing the CEE model. A Pearson's r correlation coefficient was used to examine the relationship between patients' mobility dependence and the proportion of time they watched television. Mobility dependence was determined by the ward physiotherapist which was extracted from patients' medical notes. For each participant, the level of mobility dependence has been described using one of the following categories: independent; minimum assistance to standby assistance; 2 x (person) assistance; and full hoist.

7.1.1 Effect of Aphasia on Control and Intervention Group Patient Engagement in Language Activities

The presence of a CEE model and aphasia did not significantly influence the proportion of observed time (on average) patients engaged in language activities ($F(1,10)=0.118$, $P=0.74$).

Figure 5.

Proportion of Behaviour Mapping Timepoints Control Group (PWA and PWOA) and Intervention Group (PWA and PWOA) were engaged in Language Activities



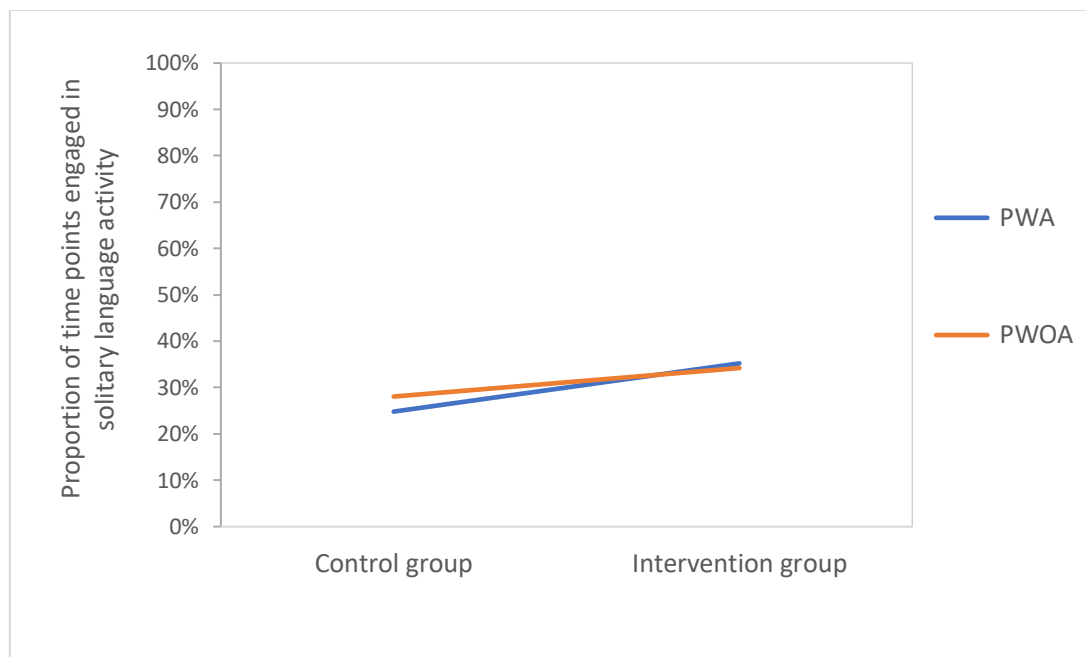
PWA=patient with aphasia; PWOA=patient without aphasia

7.1.2 Effect of Aphasia on Control and Intervention Group Patient Engagement in Solitary Language Activities

On average, the intervention group had a higher proportion of behaviour mapping timepoints in which participants were engaged in solitary language activities (35% (SD 18)) than the control group (27% (SD 11)). However, this difference was not significant ($F(1,12)=1.214$, $P=0.292$). The presence of a CEE model and aphasia did not significantly influence the amount of time patients engaged in solitary language activities ($F(1,10)=0.054$, $P=0.821$).

Figure 6.

Proportion of Behaviour Mapping Timepoints Control Group (PWA and PWOA) and Intervention Group (PWA and PWOA) were engaged in Solitary Language Activities



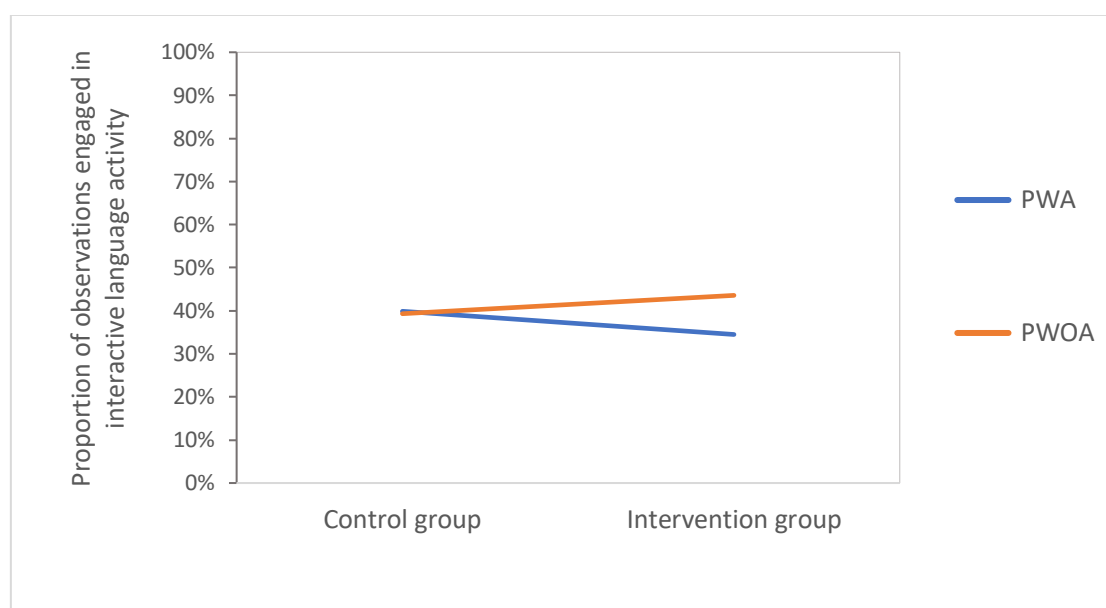
PWA=patient with aphasia; PWOA=patient without aphasia

7.1.3 Effect of Aphasia on Control and Intervention Group Patient Engagement in Interactive Language Activities

On average, the intervention group patients with aphasia (PWA) had a lower proportion of behaviour mapping timepoints in which participants were engaged in interactive language activities (37% (SD 11)) than the control group PWA (40% (SD 7)). On average, the intervention group patients without aphasia (PWOA) had a higher proportion of behaviour mapping timepoints in which participants were engaged in interactive language activities (42% (SD 17)) than the control group PWOA (40% (SD 16)). However, the presence of aphasia did not significantly influence the amount of time patients engaged in interactive language activities between the control and intervention group ($F(1, 10)=0.134$, $P=0.722$).

Figure 7.

Proportion of Behaviour Mapping Timepoints the Control Group (PWA and PWOA), and Intervention Group (PWA and PWOA) were engaged in Interactive Language Activities



PWA=patient with aphasia; PWOA=patient without aphasia

7.1.4 Summary: Differences in Activity Between the Control and Intervention Group PWA and PWOA

Intervention group PWOA engaged in higher levels of language activities than intervention group PWA despite more elements of the CEE model being implemented for PWA (see Chapter 6). Intervention group PWOA also engaged in higher, but not significant, levels of interactive language activities compared to the control group PWOA. However, intervention group PWA engaged in lower, but not significant, levels of interactive language activities compared to the control group PWA. There were a number of factors that may have influenced the engagement in language activities for the intervention group PWA. As detailed in Chapter 6, the intervention group PWA had fewer visitors compared to all other patient groups. Additionally, as reported in Chapter 6, the presence of visitors was significantly correlated with patient engagement in interactive language activities. Chapter 6 also detailed that control and intervention group PWA were also, on average, more dependent for their mobility in comparison to control and intervention group PWOA. Across the control and intervention group patients, PWA had mild aphasia. However, intervention group PWA had higher stroke severity than all other patient groups.

As detailed in Chapter 5, in the before phase of this study, patients and staff perceived patients' reduced mobility and their reliance on staff as a barrier to engagement in activities, a finding consistent with other studies (Kenah et al., 2018). Reliance on staff for engagement in language activities may have been exacerbated by changes in staffing levels that occurred during the study period such as the reduction in the nurse-to-patient ratio. It was also noted that the CEE model afternoon tea was not run for two intervention group PWA as a result of low staffing, which is likely to be reflected in their levels of engagement in interactive language activities. Therefore, the intervention group PWA may have had lower levels of engagement in language activities as a result of having less visitors and increased dependence on time poor staff compared to the other patient groups.

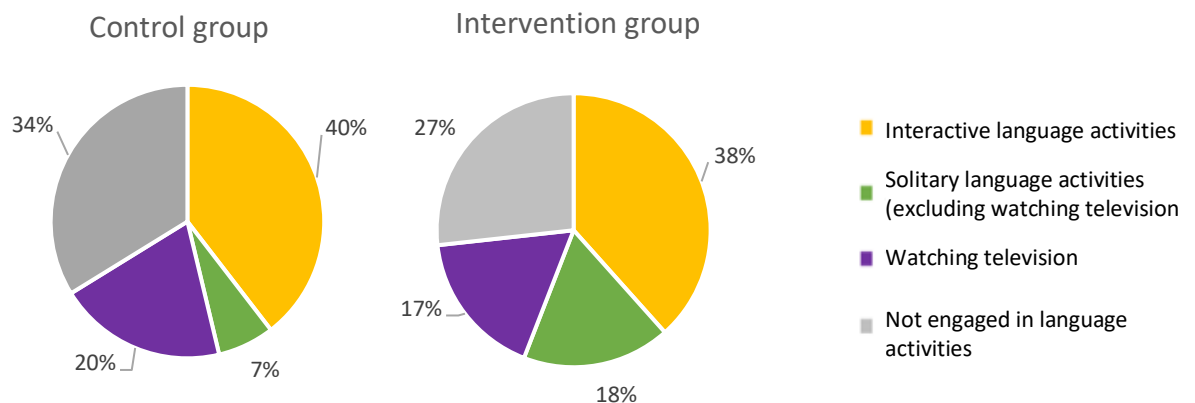
Research indicates that patients' dependence for mobility contributes to their experience of boredom as they are often restricted to their bedside (Kenah et al., 2018). This has been associated with a loss of patient autonomy and sense of control and can contribute to becoming passive recipients in their care (Kenah et al., 2018). Aphasia is commonly associated with increased disability and poorer outcomes (Flowers et al., 2013) consistent with the aphasia cohort presented in this study. Therefore, these results highlight the vulnerability of this group in regard to inactivity during their stroke admission and the need to further cater to this population in future iterations of the CEE model.

7.1.5 Proportion of Time Control and Intervention Group Patients Spent Watching Television

When analysing the proportion of occurrences in which participants were watching television, as a separate activity from other solitary language activities, the intervention group spent less time watching television (17% (SD 19)) than the control group (20% (SD 7)). This difference was not significant on a one-way ANOVA ($F(1, 12)=0.111, P=0.745$). The intervention group engaged in solitary language activities (other than watching television), on average, 11% more than the control group.

Figure 8.

Proportion of Behaviour Mapping Timepoints Control Group and Intervention Group Patients (PWA and PWOA) Watched Television (Separating Watching Television from Solitary Language Activities)

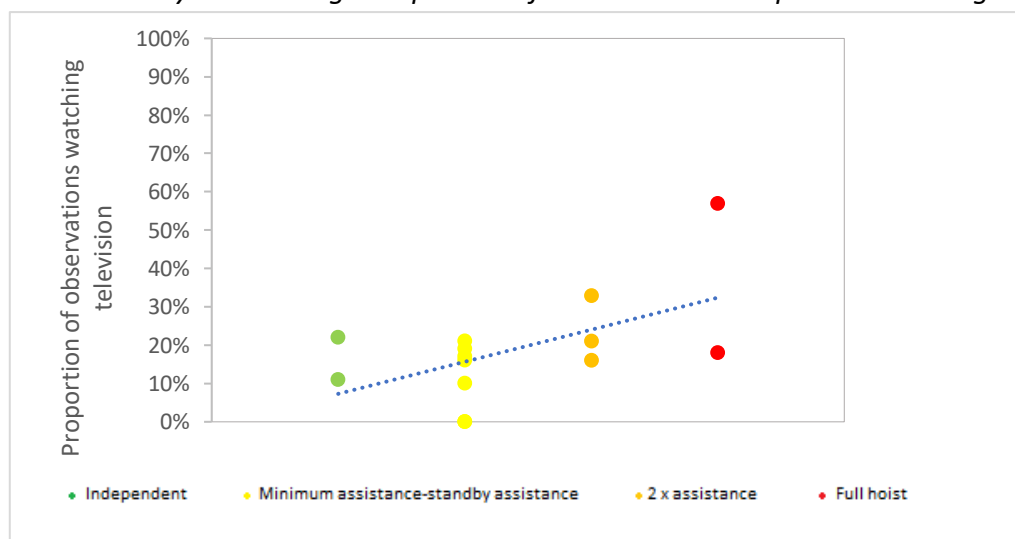


7.1.6 Relationship Between Patients' Mobility Dependence and the Proportion of Time They Watched Television

Overall, there was a moderate positive correlation between patients' level of mobility dependence and the proportion of observation timepoints they spent watching television ($r=0.427$).

Figure 9.

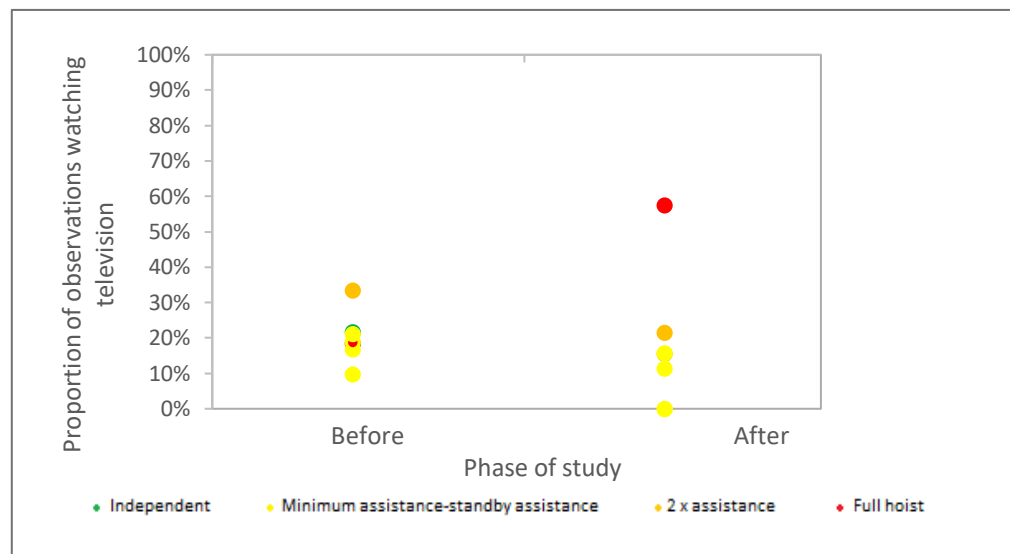
Patients' Mobility and Average Proportion of Observation Timepoints Watching Television



As shown in Figure 10, the patient who was the most dependent for their mobility, in the after phase, watched more television in comparison to patients who required less assistance for their mobility.

Figure 10.

Proportion of Behaviour Mapping Timepoints Watching Television and Control and Intervention Group Mobility



7.1.7 Summary: Watching Television Before-and-After Implementing the CEE model

When looking at watching television as a separate activity, the intervention group engaged in solitary language activities (other than watching television) on average 11% more than the control group. The intervention group spent 3% less time, on average, watching television compared to the control group. In the after phase, the patient who was the most dependent for their mobility watched more television in comparison to the rest of the patient cohort.

Our definition of solitary language activities included watching television, however watching television was not a specifically targeted CEE model initiative. There was much debate within the research team about whether to include watching television as a language activity. Watching television could be considered a passive activity if an individual was not attending to it or was not actively engaging in the television program. Conversely, watching television could be an engaging language activity potentially stimulating language

and cognitive processes. Although it was beyond the scope of this study for an observer to discern the difference between 'passive' or 'active' television watching, the decision was made to include watching television within the definition of solitary language activities given the potential for this activity to positively influence aphasia recovery.

Removing watching television as a language activity may be a more accurate reflection of patient engagement in CEE model initiatives, as watching television was not a specifically targeted language activity. The intervention group engaged in solitary language activities (other than watching television) 11% more, on average, than the control group. However, the intervention group patient who was the most dependent for their mobility watched more television in comparison to the other intervention group patients. It could be deduced that the CEE model may have been the most sensitive to the patients who were independent or required up to two people to assist with their mobility. This may have been the result of patient dependence on staff to set up activities such as the electronic tablet or run activities such as the afternoon tea. Previous EE models embedded on acute and rehabilitation wards included bedside packs and found significant increases in patient activity (Janssen et al., 2014b; Rosbergen et al., 2017a). Consideration of a bedside pack or activities that patients could initiate independently from their bedside may be essential in the future development of a CEE model to promote patient driven engagement in language activity particularly for patients who are dependent for their mobility and care needs.

7.2 CEE model and Aphasia Communication Partner Training Staff and Volunteer Survey Results

Staff and volunteers completed a voluntary survey to provide feedback on the CEE model and aphasia communication partner training sessions. The survey was completed immediately following participation in their specific training session (prior to leaving the training room).

The survey (Appendix J) consisted of Likert scale (0-10) statements and open-ended items. The three Likert scale statements were used to determine staff and volunteers' perceptions of the training in regard to the relevance and informativeness of the training and whether the allocation of time within the session was adequate. The four open statements/questions were used to determine the elements of training program that staff

and volunteers liked, the aspects of the training program they perceived could be improved and how staff and volunteers planned to change their practice as a result of training. It also provided an opportunity to provide any other comments.

7.2.1 Likert Scale Responses

Responses to the Likert scale statements were manually measured by the author of this thesis with a numeric value score based on this measurement (0-10). The mean value for each response was calculated based on these numeric value scores. Overall, staff and volunteers attributed mean scores above 9.80 to the Likert scale statements regarding the training relevance, informativeness and the appropriate allocation of time for the training session:

- i) The training was relevant to me: 9.88 (SD 0.42);
- ii) This training program was informative: 9.95 (SD 0.17);
- iii) The time allocated for the training session was adequate: 9.93 (SD 0.23).

High ratings were also evident for each occupation group where nurses, volunteers, and social workers rated scores of 10 across each Likert statement indicating satisfaction with the relevance and informativeness of the training, and the allocation of time in the training session. Physiotherapists, therapy assistants and occupational therapists also attributed means score of: 9.79-9.92 in regard to relevance, 9.81-9.95 in regard to informativeness and 9.62-10.00 in regard to appropriate allocation of time for the training session. See Table 10. for the breakdown of mean Likert scores for each occupation group.

Table 9.

Mean Scores on the Likert Scale Statements Grouped by Occupation

| Occupation group | Number of respondents | Likert Scale statement mean score (SD) | | |
|------------------|-----------------------|--|---------------------------------------|--|
| | | The training was relevant to me | This training program was informative | The time allocated for the training session was adequate |
| AcuteN | 6 | 10 (0) | 10 (0) | 10 (0) |
| RehabN | 8 | 10 (0) | 10 (0) | 10 (0) |

| | | | | |
|-----|----|-------------|-------------|-------------|
| PT | 12 | 9.79 (0.72) | 9.95 (0.16) | 10 (0) |
| TA | 6 | 9.68 (0.38) | 9.81 (0.33) | 9.62 (0.49) |
| OT | 6 | 9.92 (0.20) | 9.92 (0.20) | 9.92 (0.20) |
| Vol | 2 | 10 (0) | 10 (0) | 10 (0) |
| SW | 1 | 10 (0) | 10 (0) | 10 (0) |
| N/P | 1 | 10 (0) | 10 (0) | 10 (0) |

AcuteN= acute ward nurse; RehabN= rehabilitation ward nurse; OT= occupational therapist; SW=social worker; PT= physiotherapist; TA= Therapy assistant, V= volunteer, N/P= occupation group was not provided in the survey response

7.2.2 Free Text Responses

Free text responses were transcribed word for word. Data were grouped into categories according to their content. Minor themes were included in the reported results to capture all perspectives. Some responses overlapped themes. These responses were coded under both relevant themes and are presented together with the relevant questions in the sections below.

Tell us what you liked most about the training program. The majority of the responses (n=24, 57%) were related to the role plays within the training session. Staff and volunteers reported finding the role play helpful and practical, and felt they provided some insight into what it might be like to experience a communication impairment. The role plays were also perceived to provide a valuable opportunity to practise the strategies discussed in the training session and receive feedback and guidance from the training facilitator. Staff and volunteers described the training as practical, simple and interactive, and provided an opportunity to try the CEE model resources. Examples of direct responses are provided below:

- Worthwhile and simple strategies given and opportunities for practise (PT)
- Quick, informative, real time practise with the [communication support] packs (PT)
- Very interactive, very informative (RehabN)
- That it is practical and easy to implement and has the potential to improve patient care. The role playing was very useful (AcuteN)

The hands-on practise to try the strategies, and the trying the patient and therapist roles. (OT)

One staff member reported they liked completing training in a small group:

Small group (RehabN)

Staff reported the video demonstrating the use of the trained strategies during a patient interaction was helpful to facilitate their understanding of how to use them:

... watching example with patient (TA)

One staff member reported that online feedback and assistance provided by the facilitator in problem solving communication breakdowns in the role play during training was helpful:

Practical examples and demonstrations and assistance provided by [the facilitator] to correct and provide useful tips where needed (OT)

One staff member reported they valued receiving the poster detailing the communication strategies:

... provided with strategies as a handout to keep to refer back to (PT)

Eleven responses were related to the specific training strategies provided in the session. Examples of these responses include the following:

Giving concrete (hierarchical) strategies to aid pt's [sic] communication (PT)

The instructor's ability to relate the information. The use of communication [tips] board at the patient's bedside (AcuteN)

Communication tools (RehabN)

Learned [sic] great tips to help me on the ward to communicate with patients better (TA)

One staff member and one volunteer reported they valued the information about the CEE model and staff roles in regard to the model within the training program:

It gave great insight to this new, exciting program (RehabN)

The background given was very informative and explained the need for and role of this program (Vol)

What aspects of the training program could be improved? Fourteen participants (33%) responded that no improvements could be made in the CEE model information session and communication partner training program. This response was provided by acute nurses (29%, n=4), rehabilitation nurses (36%, n=5), physiotherapists (14%, n=2), a volunteer (7%, n=1), an occupational therapist (7%, n=1), and one participant who didn't report their occupation (7%, n=1). Examples of the responses include the following:

Nothing all great (RehabN)

None- it was great (PT)

Two responses (5%; volunteer, n=1, rehabilitation nurse, n=1) requested the provision of additional role plays with different scenarios:

More role play [sic] with different situations (Vol)

More role play [sic] (RehabN)

One response (2%) was related to being provided more time in the first role play at the beginning of the session. This role play was conducted prior to any communication partner training. In training, these role plays were repeated at the end of the training session to provide participants with the opportunity to use the trained strategies and seek support from the facilitator to problem solve communication break downs using trained strategies.

More time in the first session of role playing (OT)

Three responses (7%) were related to being provided with more video examples, or real-life communication scenarios, to demonstrate the use of the trained strategies:

Maybe some more videos of real patients to show other strategies (OT)

Would be good to see a real-life case scenario (TA)

More examples of how to use the communication tools (OT)

One response (2%) was related to the timing in the day that the training session was provided where training was conducted at the end of a nursing shift:

Training at the start of shift (RehabN)

One response (2%) reported that the facilitator's presentation at the beginning of the training was rushed:

The speaking was a little rushed at the beginning (TA)

How do you hope to change your practice as a result of training? Forty-one participants responded to this question. Twenty-one responses (51%) related to having increased awareness, confidence and ability to use trained strategies and resources in interactions with PWA:

Knowing what tools are available to try another way of communicating before leaving without having some idea of what the patient is trying to communicate (PTA)

Try and understand the message the patient wants to communicate using communication aids which are really helpful in understanding from role play (AcuteN)

Using the communication tool more regularly and appropriately (RehabN)

More skill and confidence to work with this area of patient [sic] (OT)

Twenty-two responses (52%) were related to staff and volunteers hoping to change their approach to communication interactions and how this might improve patient care:

Better communication with patients for better patient safety outcomes (AcuteN)

More understanding patient's condition. Improve my communication skills with them (AcuteN)

Very motivated to practise the new skills learnt in training as ↑ effective communication is so important for the patient's quality of life (AcuteN)

Have more successful communication experiences with pts with aphasia. ↑ confidence to attempt communication (PT)

Any other comments? There were eleven responses to this question. All additional comments were related to enjoying and appreciating the training program:

Very good! X (RehabN)

This was very valuable! (AcuteN)

Well done. Encourages people to think outside the box (PT)

Thank you for the training and tips! It was extremely useful and relevant (SW)

Great training! Thank you (PT)

Enjoyed the training. Well done 😊 (TA)

7.2.3 Respondent Demographics

There were 42 respondents (staff members n=39, volunteers n=2, occupation/role not provided n=1). The majority of respondents were aged between 26 and 35 with six to ten years of experience in their role (Table 9). Thirty-eight respondents worked on the participating study wards at the time of data collection, eleven respondents worked on the acute ward, 22 on the rehabilitation ward, and five on the acute and rehabilitation wards. Four worked on other wards at the time of data collection.

Table 10.

Demographics of Survey Respondents

| Age | | | | | | | |
|------------------------------|-------|-------|-------|-------|-------|-----|-----|
| | 18-25 | 26-35 | 36-40 | 41-50 | 51-60 | 61+ | N/P |
| n | 4 | 18 | 6 | 4 | 5 | 1 | 4 |
| Hospital role | | | | | | | |
| | Nurse | OT | SW | PT | TA | V | N/P |
| n | 14 | 6 | 1 | 12 | 6 | 2 | 1 |
| Year/s of experience in role | | | | | | | |
| | <1 | 1-5 | 6-10 | 11-20 | >21 | | |
| n | 1 | 14 | 17 | 6 | 4 | | |

OT= occupational therapist; SW=social worker; PT= physiotherapist; TA= Therapy assistant, V= volunteer, N/P= Not provided in the survey response

7.3 Summary

Feedback on the CEE model and aphasia communication partner training overall was very positive. Staff and volunteers provided high approval rates in regard to relevance, informativeness and appropriate allocation of time in the training session. Staff and volunteers reported that the background information on the study and the theoretical approach was informative and explained the need for the CEE model. This aligns with the behaviour change strategy of providing information about health consequences (see Chapter 6, Appendix D) which has the potential to influence an individual's level of motivation to change a behaviour (Michie et al., 2015). Staff and volunteers valued that the training was "quick, informative" and "practical". The training program and the CEE model was co-designed with hospital staff, with the aim to develop an intervention that was pragmatic, practical and easy to implement. This involved analysing factors influencing staff, volunteers' and patients' behaviour in the before phase of this study (Chapter 5), where time limitations were perceived by staff and patients to be a barrier to communication. This survey feedback may reflect the value of considering the barriers to an intervention and behaviour change to promote the usability and uptake of interventions by stakeholders.

Staff and volunteers perceived training increased their skills in using communication strategies. A large proportion of staff and volunteers reported increased awareness of resources that could aid communication with patients, perceptions of increased confidence in using trained strategies and willingness to approach communication interactions with PWA. This is consistent with previous research whereby communication partner training significantly improved staff knowledge of aphasia and their attitudes towards communication (Horton et al., 2016; Jensen et al., 2015; McGilton et al., 2009). Staff and volunteers' feedback reflected perceptions that use of trained strategies and resources in the CEE model would enhance patient care and result in improved patient outcomes. These perceptions are in line with research that found communication partner training translated to improved patient outcomes in regard to more accurate patient diagnoses, care and treatment, and improved professional patient relationships (Hersh et al, 2016; Legg et al., 2005; McCabe, 2004; McGilton et al., 2009; Street et al., 2009).

The role plays within the training session were valued by staff and volunteers who found the trained strategies easy and practical. Staff and volunteers also wanted

opportunities to participate in a different role plays to practise using these trained strategies in a variety of contexts. They reported value in the integration of the CEE model initiatives within the training program, such as the communication tips board, the communication support packs, and the poster detailing the trained communication strategies. The video example of the trained strategies in an interaction with a person with aphasia were perceived as valuable. Staff and volunteers requested additional video examples across a variety of patient interactions. This feedback aligns with the behaviour change principles of: providing instructions on how to perform a behaviour; demonstrating a behaviour in training; practising a behaviour in training; receiving feedback on targeted behaviours and monitoring individual's emotional consequences within the role plays (Chapter 6, Appendix D). This feedback suggests these elements of the behaviour change approach were considered valuable to staff and volunteers during training and should be continued in future studies of a CEE model.

One staff member reported they liked completing the training in a small group. Training in small groups enabled the facilitator to provide online feedback and assistance in problem solving communication break downs in the role plays. This suggests the provision of training in small groups should be continued in future iterations of the training program. Additionally, considerations should be made in regard to the timing of training, as feedback from one participant requested training be provided at the start of the nursing shift, rather than at the end. This may reflect the challenging nature of interventions within a busy hospital setting and how training fits around other clinical demands. We suggest there may be benefit in exploring this in future studies to promote nursing engagement in training programs and facilitate the long-term useability of the training program.

Appendix J.

Staff communication partner training post-training questionnaire

Questionnaires will be anonymous and compiled and analysed as a group.
Please ensure you complete all sections.

Age group:

18-25 26-35 36-40 41-50 51-60 61+

Ward:

Acute Rehabilitation Other (please specify)

Hospital role:

Doctor Nurse Patient Service Assistant Patient Catering Assistant Volunteer

Occupational Therapist Social Worker Physiotherapist Dietitian Therapy Assistant

Other
(please specify)

Years of experience in your role:

less than 1 year 1-5 years 6-10 years 11-20 years more than 21 years

The training was relevant to me:

Disagree Neither agree nor disagree Agree

This training program was informative:

Disagree Neither agree nor disagree Agree

The time allocated for the training session was adequate:

Disagree Neither agree nor disagree Agree

Tell us what you liked most about the training program.

What aspects of the training program could be improved?

How do you hope to change your practice as a result of training?

Any other comments?

Thank you for your participation!

This study has been approved by the Human Research Ethics Committees at Edith Cowan University (Ethics approval number 12149) and Hollywood Private Hospital (Ethics approval number HPH431). If you have any concerns or complaints about the research project and wish to talk to an independent person, you may contact: Kim Gifkins, Research Ethics Officer, Edith Cowan University, phone: (08) 6304 2170, email: research.ethics@ecu.edu.au

Foreword to Chapter 8

Title of publication: Patients' Experiences of a Communication Enhanced Environment model in a mixed acute/rehabilitation ward and a rehabilitation ward following stroke: A Qualitative Description Approach.

Authors: D'Souza, S., Hersh, D., Godecke, E., Ciccone, N., Janssen, H., & Armstrong, E.

Author contributions: All authors designed the study and the protocol. SD conducted participant recruitment, interviews, transcriptions and data analyses. DH completed the second review of qualitative themes. SD wrote this manuscript. DH, EG and NC worked with SD in the development of the final version of this manuscript. All authors contributed to manuscript editing and approved the final manuscript.

This article is under second review by Disability and Rehabilitation.

This chapter reports on the qualitative investigation of after phase patients' (the intervention group) perceptions of communication interactions and language activities. This includes their perceptions of barriers and facilitators to engagement in the CEE model initiatives during their in-patient hospital admission with the CEE model implemented in usual care.

Chapter 8. Intervention Group Qualitative Data

Abstract

Background: Patients in hospital following stroke express a desire to continue therapy tasks outside of treatment activities. However, they commonly describe experiences of boredom and inactivity. An enriched environment aims to provide opportunities for physical, cognitive and social activity and informed the development of a Communication Enhanced Environment (CEE) model to promote patient engagement in language activities.

Purpose: Explore patient perceptions of a CEE model, and barriers and facilitators to engagement in the model.

Method: A qualitative description study from a larger project that embedded a CEE model in acute and rehabilitation private hospital wards in Western Australia. Semi-structured interviews were conducted with seven patients, including four with aphasia, within 22 days post-stroke who had access to the CEE model.

Results: Patients described variable experiences accessing different elements of the CEE model which were influenced by individual patient factors, staff factors, hospital features as well as staff time pressures. Those who were able to access elements of the CEE model described positive opportunities for engagement in language activities.

Conclusions: While these findings are encouraging, further exploration of the feasibility of a CEE model in this complex setting is indicated to inform further development of this intervention.

Keywords: stroke, aphasia, Communication Enhanced Environment model, enriched environment, patient experience

Implications for rehabilitation:

- Patient access of a CEE model is challenging in a hospital setting
- Patients who were able to access elements of the CEE model described positive opportunities for engagement in language activities.
- Patients accessing to the CEE model was influenced by patient factors, staff factors, hospital features as well as staff time pressures.

Reporting guidelines checklist: The consolidated criteria for reporting qualitative studies (COREQ) (Tong et al., 2007) was used to guide the reporting of this study (Appendix K).

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8.1 Introduction

It is recognised that the environment can influence neural remapping during early stroke recovery (Kolb & Tesky, 2010). However, the current hospital environment may reflect what is considered impoverished (Ana°ker et al., 2019; King et al., 2011; Maben et al., 2016; McDonald et al., 2018; Persson et al., 2015; Rosbergen et al., 2017a; Shannon et al., 2018; Singh et al., 2016; West & Bernhardt, 2012) with patients following stroke spending large proportions of their day alone and inactive (Janssen et al., 2014a). Patients in hospital following a stroke express a desire to continue therapy tasks outside of treatment, perceiving time outside of therapy as an opportunity to practise rehabilitation activities within the real-world environment (Eng et al., 2014). Further to this, boredom is commonly experienced by patients, which has the potential to negatively affect their engagement in stroke rehabilitation (Kenah et al., 2018). Patients report that a lack of meaningful activity is strongly associated with boredom (Kenah et al., 2018). Boredom is highly correlated with depression and apathy, and is perceived by patients to negatively affect their participation in rehabilitation (Kenah et al., 2018). Patients following stroke perceive a lack of stimulation and inactivity impacts their ability to “drive” their own rehabilitation outside of therapy, describing this time as “dead and wasted” (Eng et al., 2014, p. 4). Nurses have been observed to be the most common communication partner for patients, after their family members (Godecke et al., 2014). However, nurses in a stroke rehabilitation unit report that time constraints often limit their capacity to comfort, talk with and provide education to patients (Ball et al., 2014). This lack of time for communication and education has also been identified by patients who “did not like to bother the busy nurse” (McCabe, 2004, p. 44).

Aphasia is a communication disorder that occurs in approximately 30% of stroke survivors (Engelter et al., 2006) and affects all modalities of communication including speaking, listening, reading and writing. Aphasia is associated with higher levels of disability, and has significant negative consequences for social participation, interpersonal relationships, autonomy, capacity to work and quality of life (Kruithof et al., 2013). Patients with aphasia (PWA) following stroke have been observed to spend less than 30% of their day communicating with others and 44% of their day alone during their first weeks of in-patient rehabilitation (Godecke et al., 2014). This places PWA at increased risk of developing

learnt non-use of language as a result of inadequate opportunities for communication (Godecke et al., 2014).

An enriched environment (EE) aims to provide greater opportunities for physical, cognitive and social activity has been shown to contribute to significant improvements in neuroplasticity, motor recovery and a trend towards significant improvements in cognition in animal stroke models (Janssen et al., 2010). Application of EE in an acute (Rosbergen et al., 2017a) and rehabilitation stroke unit (Janssen et al., 2014b) has been shown to significantly increase patient engagement in physical, cognitive and social activity. Aphasia is a complex language impairment and PWA may need support within an EE. The principles of EE informed the development of a Communication Enhanced Environment (CEE) model to facilitate engagement in language activities for patients following stroke, which incorporated the needs of those with aphasia (D'Souza et al., 2021b, Chapter 6). The definition of language activities encompassed any activity that involved the use of language including both solitary (i.e., reading, writing) and interactive (i.e., talking or listening to a communication partner) language activities. This CEE model was co-designed with hospital staff and considered hospital policies and procedures and incorporated evidence-based strategies, expert opinion, and patient perceived barriers and facilitators to their engagement in language activity following stroke (D'Souza et al., 2021b, Chapter 6). The model sought to promote access to physically enhanced communal spaces, trained communication partners, resources, and organised social activities (D'Souza et al., 2021b, Chapter 6). Results from piloting the CEE model found that 71% of the model was reported to be available to the intervention group. Additionally, the intervention group engaged in higher, but not significant, levels of language activities (600 of 816 observation time points, 73%) than the control group (551 of 835 observation time points, 66%) (D'Souza et al., 2021b, Chapter 6).

This study sought to explore patient perceptions of communication interactions and language activities including the perceived barriers and facilitators to engagement in the CEE model during their hospital admission. The specific research questions were:

- i. What are patients' perceptions of communication interactions and language activities during their hospital admission following stroke where the CEE model was implemented in usual care?

- ii. What do patients perceive to be barriers and facilitators to engagement in the CEE model?

8.2 Method

8.2.1 Design

This qualitative study was conducted as part of a larger project which developed, embedded and evaluated a CEE model within two hospital wards.

There were three phases to the larger project:

- i) Before phase: observed and quantified the usual care ward environments;
- ii) Implementation phase: developed and implemented the CEE model;
- iii) After phase: assessed the implementation and explored the effects of the CEE model.

Participants in this study were recruited to the after phase of the larger project where the CEE model was embedded in usual care. Semi-structured interviews were conducted with patients following stroke (n=7) from November 2018 to December 2019, within thirteen months of embedding a CEE model in the hospital wards. Ethics approval was obtained from Hollywood Private Hospital Research Ethics Committee (HPH431) and Edith Cowan University Research Ethics Committee (ECU HREC 12149). The study protocol can be accessed via the supplementary file of a publication from the larger project (D'Souza et al., 2021a [study protocol not included in this thesis, see Chapter 4 for methodological framework]).

8.2.2 Methodological Framework

A qualitative descriptive approach was utilised to explore participants' experiences, perspectives and insights (Neergaard et al., 2009). This approach values description without the need for deep conceptualisation or abstraction (Neergaard et al., 2009; Sandelowski, 2000). It remains close to the words of the participants, seeks an accurate, comprehensive account of events as they choose to present them with a low level of interpretation (Neergaard et al., 2009; Sandelowski, 2000). Qualitative description has been identified as an appropriate qualitative approach to inform the development and refinement of an intervention involving a vulnerable participant group (Neergaard et al., 2009).

8.2.3 Setting

This study was conducted on two hospital wards, one acute and slow stream rehabilitation ward and one rehabilitation ward, at a private hospital in Perth, Western Australia. The acute and slow stream rehabilitation ward had 30 beds with patients following stroke and other medical conditions. There were 26 individual rooms and two shared rooms with two beds per room. Patients ate meals in their rooms and did not have access to a communal dining area. The rehabilitation ward had 44 beds with patients following stroke and other medical, orthopaedic and post-surgical conditions. There were 36 individual rooms, and four shared rooms with two beds in each room. Patients ate breakfast in their rooms. Patients were usually encouraged to have lunch and dinner in a communal dining area. A reduction in the nurse-to-patient ratio occurred during the study period. The number of patient admissions following stroke on the participating wards reduced over the study period which was not anticipated by the researchers. Please refer to the larger study's main results paper for details of the staff levels and stroke admissions during the study period (D'Souza et al., 2021b, Chapter 6).

8.2.4 Participant Selection

All consecutively admitted patients following stroke were screened by two hospital site champions (a senior physiotherapist and a speech pathologist) for eligibility to participate in this study from November 2018 to December 2019, following implementation of the CEE model on the wards. This provided a sample that aligned with the naturally occurring heterogeneity of stroke survivors, rather than a purposive sample, to reflect the 'real-world' nature of this intervention. The larger study aimed to recruit eight patients in the after phase (PWA=4; patients without aphasia (PWOA)=4), a convenience sample to allow for patient observations across allocated time frames in the larger study (see D'Souza et al., 2021b, Chapter 6). Despite the focus of aphasia within the CEE model, this intervention also sought to meet the communication needs and experiences of inactivity for those without aphasia therefore PWOA were also included in this study.

Patients were eligible for inclusion if they were: admitted to the participating wards and were within 21 days post-stroke at the time of recruitment; had the ability to provide informed consent as determined by the hospital medical team; had a Glasgow Coma Scale

(Teasdale & Jennett, 1974) score greater than 10 at the time of screening; had an estimated length of stay greater than 14 days; and had adequate English proficiency to participate in interviews. Patients were excluded if: they had a hearing impairment without hearing aids or had a vision impairment which impacted on reading; were medically unstable; had a documented diagnosis of dementia, traumatic brain injury, previous aphasia or current untreated depression; or were a participant in another research trial which may have affected the outcome measures of this study. PWA were identified through usual ward aphasia screening completed by the ward speech pathologist. The presence of aphasia was confirmed with a Western Aphasia Battery-Revised (Kertesz, 2006) Aphasia Quotient score less than 93.7.

Twelve patients met the inclusion and exclusion criteria. These patients were approached by the site champions to obtain verbal consent to meet with the first author to discuss participation in the study. Eight patients consented to participate in the study. One participant withdrew their consent prior to the commencement of data collection (they did not provide a reason). Data collection was completed for seven participants (PWA=4, PWOA=3). Participant demographics, stroke and aphasia characteristics are summarised in Table 11.

Table 11.

Participant Demographics

| | Group (n=7) | PWA (n = 4) | PWOA (n = 3) |
|---|----------------|----------------|-----------------|
| Participants | | | |
| Age (yr), median (range) | 83 (54-95) | 93.5 (54-95) | 77 (77-83) |
| Sex, n females | 4 | 3 | 1 |
| Education, n tertiary educated | 2 | 1 | 1 |
| Pre-morbid mobility, n needing aids | 4 | 3 | 1 |
| Pre-morbid living arrangement, n alone | 3 | 2 | 1 |
| Time since stroke (d), mean (SD) | 15 (3) | 14 (2) | 15 (4) |
| Stroke severity (NIHSS 0-42), mean (SD) | 5 (3) | 6 (3) | 3 (3) |
| Mild, n score < 8 | 6 | 3 | 3 |
| Moderate, n score 8-15 | 1 | 1 | 0 |
| Severe, n score > 15 | 0 | 0 | 0 |

| | | | |
|---|-----------|-----------|------------|
| Mobility status at time of data collection | | | |
| Independent +/- walking aid | 1 | 0 | 1 |
| Stand-by assistance | 1 | 1 | 0 |
| 1-2 person assistance | 4 | 2 | 2 |
| Hoist/wheelchair | 1 | 1 | 0 |
| Haemorrhagic stroke, n | 0 | 0 | 0 |
| Cognition (MoCA), median (range) | 15 (6-25) | 11 (6-15) | 21 (16-25) |
| Aphasia severity, WAB-R AQ mean, (SD) | | 81 (8.34) | |
| Ward (d) | | | |
| Acute (%) | 0 (0) | 0 (0) | 0 (0) |
| Acute/slow stream rehabilitation (%) | 9 (43) | 9 (75) | 0 (0) |
| Rehabilitation (%) | 12 (57) | 3 (25) | 9 (100) |
| Average number of days in single room per participant (%) | 2.6 (86) | 3 (100) | 2 (67) |

Notes: NIHSS=National Institute of Health Stroke Scale (National Institute of Neurological Disorders and Stroke, 2011); MoCA= Montreal Cognitive Assessment (Nasreddine et al., 2005); WABAQ=Western Aphasia Battery-Revised (Kertesz, 2006) Aphasia Quotient score.

8.3 Intervention

The CEE model comprised of communication partner training for staff, access to language and communication promoting resources and equipment, and enhancement and access to communal areas (communal areas were only available on the rehabilitation ward) (Table 12). The CEE model was then embedded in the usual care ward environments over an eleven-week period prior to participant recruitment. Please refer to the larger study's main results paper (D'Souza et al., 2021b, Chapter 6) for more details on the CEE model initiatives and implementation process. Availability of the CEE model was monitored for each participant by the hospital site champions (Table 12). All patients were on the talking program. The afternoon tea was not run for two PWA because of low staffing and one PWOA did not attend the afternoon tea because of a clash with a Physiotherapy session. Volunteer orientation to the ward occurred for two PWA. Two PWA declined the electronic tablet loan. One PWA had access to the communal area. Two PWA and two PWOA attended the afternoon tea. Although communal dining and access to communal areas were targeted within the CEE model, patients had limited access to communal areas as a result of circumstances which were not anticipated by the researchers. This study initially involved an

acute ward however this ward moved during the study period (implementation phase) to combine with another ward to become a combined acute and slow stream rehabilitation ward. This new ward did not have a communal area. Additionally, patients on the rehabilitation ward did not have access to the communal dining area for meals due limited staffing capacity to transfer patients into these areas. This was likely the result of a reduction in the nurse-to-patient ratio that occurred during the study period. Please see the larger study's main results paper for further details (D'Souza et al., 2021b, Chapter 6). The CEE model and aphasia communication partner training were provided to multidisciplinary team members: rehabilitation nurses (n=8); acute and slow stream rehabilitation nurses (n=8); volunteers (n=20); physiotherapists (n=17); occupational therapists (n=7); an Occupational Therapy assistant (n=1); a dietitian (n=1); social workers (n=5); speech pathologists (n=4); and a speech pathology assistant (n=1). However, training was not provided to all ward staff as attendance to training was voluntary and some staff opted not to receive training, some staff were unable to attend the training sessions as a result of personal leave, and some new or casual relief staff who were present on the ward at the time of patient recruitment and data collection were not working on the ward during the implementation phase of the larger study when training was provided.

Table 12.

The CEE model Initiatives and Participant Involvement in each Initiative

| CEE model initiative | Description | Participants involved in the initiative |
|--|--|---|
| CEE model and aphasia communication partner training to ward staff | Training focussed on using multimodal communication exchange Supported Conversation for Aphasia (Kagan, 1998) principles with the addition of encouraging and eliciting a verbal response. | |

| | | |
|---|--|------------------------|
| Communication tips boards displayed in patients' rooms | Individuals' communication needs were displayed on the communication tips board to guide staff and visitors to support communication, for example, "provide simple one stage instructions, encourage them to say 1-2 word phrases". Staff were trained to use the communication tips boards within the communication partner training program. | PWA4, PWA5, PWA6, PWA7 |
| Communication support posters displayed in the hospital wards and staff areas | Displayed general communication supporting strategies for PWA. | |
| Communication support packs | Provision of communication support packs which included a whiteboard, pens, alphabet board, and augmentative and alternative communication boards (a board with pictures representing basic needs and wants). Staff were trained to use the communication support packs in the communication partner training program. | PWA4, PWA5, PWA6, PWA7 |
| Joint speech pathology-multidisciplinary sessions (minimum one per week) | Encouragement to embed communication goals into therapy sessions and support the multidisciplinary team in using trained communication strategies within therapy and promote achievement of various other therapy goals as a result of increased comprehension of therapy task instructions. | PWA4, PWA5, PWA6, PWA7 |

| | | |
|---|---|---|
| Electronic tablet loan to PWA | Encouragement of PWA use of electronic tablets with language rehabilitation apps and audiobooks. | PWA4, PWA7 Note: PWA5 and PWA6 declined |
| The talking program | Staff and volunteers initiated conversations with PWA and PWOA who were identified to potentially benefit from a social interaction. These patients were identified by placing a magnet next to their names on the ward patient list. Additionally, patients identified to be on the program were communicated via email to the hospital volunteer manager to promote social interactions with volunteers | PWA4, PWA5, PWA6, PWA7, PWOA5, PWOA6, PWOA7 |
| Access and encouragement to spend time in communal areas (rehabilitation ward only) | Communal spaces were enhanced to promote socialisation (i.e., furniture placement, art). Games, books and art activities, and other resources were readily available for patients and their visitors to access. | PWA6, PWA7 |
| Volunteer orientation to the ward | Volunteer provision of orientation for new patients on the ward. This included written information about the CEE model, resources available, information about volunteer program, and the availability of communal areas. | PWA6, PWA7 |
| Weekly afternoon tea | Encouragement to attend a weekly afternoon tea run by Speech Pathology and volunteers. Patients from both wards were encouraged to attend. | PWA4, PWA5, PWOA5, PWOA6 Note: Afternoon tea not run for PWA6 and PWA7 |

8.4 Interviewer Characteristics

Data collection was completed by the first author, a speech pathologist (Bachelor of Speech Pathology, Honours) with seven years clinical experience working in the hospital setting, and eight years research experience including conducting interviews and focus groups. Rapport with participants was developed over a three-day data collection period involving 12 hours of patient observations (as part of the larger study).

The larger project formed the basis of the first author's PhD to develop and investigate a CEE model. Rigour was enhanced through the utilisation of strategies during data collection and analysis to ensure the authenticity of the data and the credibility of the findings. These strategies included clarifying participant responses during interviews and conducting a second review of the themes. To ensure the data were participant driven, the interviewer waited until the participant had finished telling their stories before asking probing questions to clarify or seek further information (Milne & Oberle, 2005).

8.5 Data Collection Methods

Participants were not informed about the CEE model. They were informed that the researcher wanted to explore the effect of the hospital environment on patient activity and patient perspectives about in-patient activity. One PWA requested to have two family members present during the interviews, otherwise the interviews were conducted in a one-on-one setting within the participants' hospital room. This allowed in-depth discussion and probing to facilitate participant discussion about potentially distressing or sensitive topics (Milne & Oberle, 2005). Interviews with PWA were conducted using supported communication strategies (Kagan, 1998) to facilitate participation and successful information exchange. All audio recorded interviews were conducted within 22 days post-stroke and lasted between 20-45 mins. The interviewer took field notes during the interviews to capture participants' use of non-verbal communication during the interviews such as their use gesture, facial expression and writing.

An interview guide was used for all interviews (Table 13). In addition to the questions in the interview guide, participants were also asked to discuss their experiences with each CEE model initiative they had been exposed to. Additionally, questions were also asked of individuals based on comments they made regarding the environment during the participant observation component of the larger study. Clarification of participant responses and the interviewer's interpretations of these responses were completed during the interviews to confirm the data were representative of participants' opinions, experiences and perceptions. This was completed during data collection, rather than after data analysis, as participants may not have recognised their individual personal story within the data as a result of the breaking up and categorisation of data during analysis (Milne & Oberle, 2005). Additionally, reading deficits are common in aphasia therefore returning transcripts for member checking may not have been accessible to this participant group.

Table 13.

Patient Interview Guide

Tell me about what kind of activities you do while you are here (in hospital).

Describe your experience of communicating with people on the ward.

What makes it easier to communicate with people on the ward?

What makes it hard to communicate with people on the ward?

What can we do to make communicating with people easier?

8.6 Data Analysis

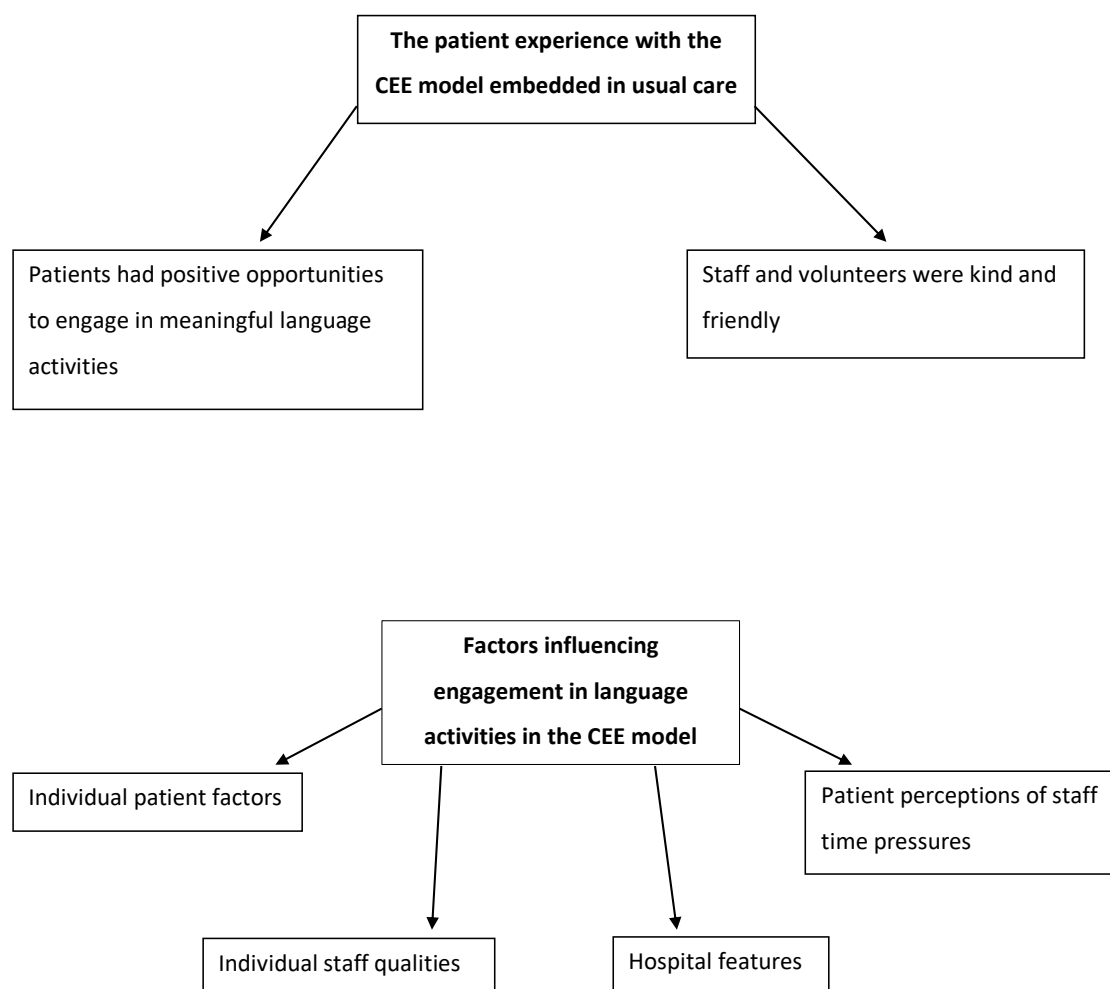
All interviews were transcribed verbatim. The data was analysed within NVivo 12 (2018) computer software with the data coded according to content. The codes were identified from the data and then organised into categories as common themes recurred through the interviews. These categories were grouped according to thematic content to identify the main themes. The data surrounding the quotes were categorised with the coded quotes to maintain the context of the data during coding. Ongoing critical review of the themes were conducted including a re-review of the data completed by the first author. A second author reviewed the themes to help ensure that categorisation was data driven (Neergaard et al., 2009).

8.7 Results

The themes were related to the patients' experiences when the CEE model was embedded in usual care and factors which influenced their engagement in elements of the model. Patient experiences were predominantly related to positive encounters with the model initiatives and the impression that staff and volunteers were friendly and caring. Factors that influenced engagement with the CEE model were related to individual patient factors, individual staff qualities and hospital features. See Figure 11 for visual representation of the results.

Figure 11.

Visual Representation of Themes



THE PATIENT EXPERIENCE WITH THE CEE MODEL EMBEDDED IN USUAL CARE

Patients had positive opportunities to engage in meaningful language activities

Overall, the elements of the CEE model appeared to provide the patients with opportunities to engage in solitary and interactive language activities. Patients reported their enjoyment participating in meaningful activities within their experiences with different elements of the CEE model including the afternoon tea, the talking program, tablet loans and joint speech pathology-multidisciplinary sessions. Patients perceived that staff and volunteers engaging with them contributed to them feeling welcomed and supported.

Yes, they both took me [walking] and we went down one corridor and another and up, and up, and up, that sort of thing...it was very good [joint Speech Pathology-multidisciplinary sessions] (PWA4)

I've been um I've been meeting with people socially [afternoon tea] a couple of very nice people and chatted. Mainly they've chatted, haven't been much to it [sic] but I listen to it quite a bit (PWA2)

There was a young lady... I was having a bad day... it was an awful day, and she was very kind she sat and talked to me for a while... it was very good [to talk to her] she was very kind... it was very easy [talking program] (PWA4)

Yeah, a lot of people [come into my room and talk to me]... I find it good, that's good. They don't have to do that... what was it like? Good, you just feel welcomed in the place [talking program] (PWOA5)

Yes, it was very good to have the iPad except that I forgot how to use it again... someone came to my rescue I think [tablet loans for audiobooks and communication apps] (PWA4)

I found it quite enlightening to get my point across from [sic] to someone that works at the hospital as a volunteer. It was quite interesting, and they seem interested in

me... it made me feel more receptive to them because they seem to be interested in me [talking program] (PWA6)

Staff and volunteers within a CEE model were kind and friendly

Patients perceived staff and volunteers as friendly as they offered help, and were happy and kind when interacting with them, which contributed to their positive perceptions of care. This may have also contributed to patient engagement in interactions with staff and volunteers.

Well, they seem younger and freer and happy (PWA5)

People in here are fantastic they really are... they always check to make sure you're alright, always willing to help (PWOA5)

They are always willing to help, and they will do whatever they can, every request, they will try to do it (PWOA6)

I thought the staff were very nice, and very nice, yes [sic] (PWA7)

FACTORS INFLUENCING ENGAGEMENT IN LANGUAGE ACTIVITIES IN THE CEE MODEL

Individual patient factors

Patients talked about their own preferences, abilities or restrictions that influenced their participation and engagement in various elements of the CEE model. These included their initiative in seeking out communication opportunities or modifying their physical surroundings to increase the accessibility of the environment, their desire to be social, and their personalities.

Well, I'm an old chatter box. What you, what you [sic], all you have to do when you talk to people is smile and then they're right (PWA5)

I got offered an iPad. I refused it...one, I don't like apple, two, it wasn't really interactive, it was pretty much this a f a is a pic [sic] picture... (PWA6)

I don't need to call people to come to get something... the phone, so if it's facing that way and I'm sitting this side, I can't reach that side, so every time I make sure it's facing me and that I can reach (PWOA6)

Patients talked about the impact of their experiences with low mood and tiredness which reduced their engagement in language activities.

The first few days I was ah, very lethargic, I didn't feel like doing anything and feeling uh, feeling lazy and not wanting to do anything... I could not think of going on to the computer, that tired (PWOA6)

I'm an avid reader but I haven't been able to settle down and read in the place, I don't know why, it's just a peculiarity, must be the [my] mood (PWOA7)

They also talked about their physical limitations such as mobility, hearing impairments and aphasia affecting their autonomy and independence, and restricting their opportunities to engage in language activities.

Well, I don't talk a lot because I'm a bit slow now and I've got to think mostly before I speak, so I haven't gone a long way with that (PWA4)

It was stultifying, you're lying on the bed and you're just completely at liberty to doze off there's nothing to stop you, so that's what you do... It's just restriction of course. If I was able to walk up and down the passage I'd get up and do that, so it's an artificial barrier that's been put there that I haven't had to deal with before... a big barrier and that affects you in a whole host of ways, you know... you ring the bell it could be 15 minutes before they turn up and um you get caught short so it's not good. You see something in the corner there, I can't get over there unless I ring the bell and get the nurse to take me, you know, so the boundaries are even smaller than they look when you first walk in here. For somebody who is reasonably active like me finds it quite hard, yeah so, they're the moans and groans (PWOA7)

Individual staff qualities

Although patients talked about positive experiences with staff in a CEE model, they also discussed their reliance on staff to engage in the model initiatives. Some patients relied on staff to assist with setting up hearing aids, charging or explaining how to use the electronic tablet, and running the afternoon tea. This theme was more prevalent for patients who were more dependent and reliant on staff to assist in engaging in the CEE model.

I haven't offered very much [at the afternoon tea] only because sometimes we've gone early in the morning... I've just had a shower then we whipped off quickly. I haven't had time to get organised, hearing aids and things like that, so I have been missing a lot of what was being said... yeah, I tried to [get my hearing aids] but they go too quickly, too early, they don't wait, so I couldn't set up and I'm battling to hear properly (PWA4)

Yes it [electronic tablet] [laughs] went off... the battery... powered off... no nobody did, no [charged the electronic tablet] ...it is quite interesting [audiobook on the electronic tablet] you know what I had so far. It's sad that it just went straight away, it went... the battery went out (PWA7)

Staff individual qualities such as their accents, whether they were perceived as being friendly, whether they gave time to interactions with patients despite being busy or whether they prioritised other clinical tasks, or whether or not staff were perceived to be patient, influenced patient engagement in language activities.

Some of the staff are willing to understand and give you time to formulated [sic] what you want to say, so that's good... some people, they don't have the patience. I've had a couple of issues, run ins, with people where they haven't taken tim [sic], the time to try and understand what I'm trying to say and I'm getting frustrated because I think they're not listening (PWA6)

Um, well people who don't speak our language maybe I don't hear properly, you know, their conversation is a little bit different to ours and so you miss some of the things (PWA4)

Hospital features

Patients talked about a range of hospital related factors impacting their ability to engage with the CEE model initiatives. Patients described the physical environment restricting their access to communication opportunities as they perceived they needed to stay in their rooms. They talked about the nature of busy time periods and quieter periods on the weekends resulting in variable opportunities for interactions with staff and other patients. They also described the limitation of scheduled therapy sessions which affected access to elements of the CEE model such as attending the weekly scheduled afternoon tea.

There's a lot that I wish I could have been doing, I mean walking around the building talking to people, having a coffee, a bad coffee, or just going outside amongst the trees listening to the breeze but I can understand why they want to keep people like me contained because they want to keep track of me and what's going on (PWA6)

Yeah, the weekends, it's just a feeling, I suppose the whole place virtually closes down which is from Friday night onwards... so the physios [physiotherapists] halve, there's no physios [physiotherapists] on, on Sunday, so that eliminates any sort of outside the ward type of activity, so for the rest of it, there's not much of it, not at all. Staff seem to be reduced. You get the feeling that it's all closed down (PWOA7)

Well, I don't communicate a lot, though they have these afternoon teas, but I've never been in a position to go to one [because of scheduled Physiotherapy sessions], so the only time I communicate with other patients is at the physio [Physiotherapy] sessions and they're all business, so mostly it's mostly the nurses I communicate with (PWOA7)

Patient perceptions of staff time pressures in the hospital environment

Patient perceptions of staff time pressures in the hospital environment related to both staff individual factors as well as hospital related factors. Patients talked about their perceptions of staff time constraints impacting their engagement in language activities and communication interactions with staff. Patients described about how staff were “rush[ing]” and “buzzing around” which contributed to their perception of them being busy. This may reflect staff appearing to be busy and as a result, patients did not want to contribute further to this. Patients also talked about experiences where staff told them they were too busy. Therefore, this theme is likely reflective of the busy hospital environment and time constraints related to clinical demands in this environment, as well as individual ways staff work in a busy environment, for example, their ability to manage a busy caseload without appearing as though they are rushing.

No, I couldn't get nurses [to help with the electronic tablet], they were too busy. Everyone said the nurse will help you, but they said “no”, they are too busy (PWA4)

They're always buzzing around. I have a bit of a chat with the doctor when he comes around but that's limited too because of their busy schedule (PWOA7)

It's not their fault they've only got a limited amount of time... it's rush, rush, rush... sometimes it's been emotionally draining cos you feel like what's the point? What am I doing? But you eventually learn to live with it and understand the system... I can understand the staff frustration because they feel rush, rush, rush, and they have a limited amount of time per patient. It's not the staffs' [sic] fault, it's not management's fault, it's just the way things work out (PWA6)

8.8 Discussion

This study revealed patient perceptions of communication interactions and language activities, and their perceptions of barriers and facilitators to engagement in the CEE model during their in-patient hospital admission. Patients described variable experiences accessing different elements of the model which were influenced by a range of perceived individual patient factors, staff factors, hospital features, as well as staff time pressures. For those that

were able to access elements of the CEE model, they described positive opportunities for engagement in language activities. Preliminary results suggest a trend towards increased patient engagement in language activities when the CEE model was embedded in usual stroke care (D'Souza et al., 2021b, Chapter 6), and results from this study indicate that those that who were able to access elements of the CEE model viewed their experiences positively.

Patients' preferences for and ability to engage in elements of the CEE model were highly individual. For example, some patients declined elements of the CEE model, such as the loaned electronic tablet. Some patients were able to initiate activities within their rooms and sought out communication opportunities, whereas others who were restricted to their bedside were more reliant on staff who were perceived to be busy. Some patients reported the impact of their mood and levels of fatigue on their desire to engage in activity. Therapy schedules limited one patient's opportunities to attend the afternoon tea and engage in communication activities in the evenings and on weekends. The challenges that patients experienced accessing the CEE model are in line with a recent Phase II feasibility study exploring EE (Janssen et al., 2021). The study found individual driven enrichment activities were difficult for patients to access and were rarely within sight or reach (Janssen et al., 2021). Within the larger project associated with the current study, 71% of the CEE model was reported to be available to the intervention group (D'Souza et al., 2021b, Chapter 6). However, this qualitative exploration of patient experiences with the CEE model embedded in usual care reveals the complex nature of accessing the CEE model in the hospital setting. Contextual issues are considered a common barrier limiting the implementation of evidence in practice (Bauer & Kirchner, 2020) and highlight the challenging nature of implementing interventions in a busy, complex ward environment. Further exploration of the feasibility and uptake of the CEE model will need to be addressed as a next step in exploring the CEE model in this complex setting.

The CEE model did not involve a bedside pack, which may have exacerbated patients' reliance on time-poor staff, and the impact of reduced staffing after hours and on weekends. This was particularly evident for patients who were more physically dependent and less autonomous in initiating interactions or modifying the physical environment to aid communication accessibility. Previous studies investigating an EE found that patients' reduced mobility acted as a barrier to engaging in activities within the model (White et al.,

2015). These patients were: more reliant on staff to engage in activities such as transferring into communal areas; more likely to be restricted to activities at their bedside; and more likely to report feelings of boredom (White et al., 2015). Boredom is associated with a loss of autonomy and sense of control and contributes to patients becoming passive recipients of care, which may have negative implications for stroke recovery (Kenah et al., 2018). Planned future development of the CEE model will include the provision of a bedside pack which would include individualised language activities such as music, books, magazines and word puzzles. It will also include prescribed communication therapy resources to provide more variety in activities to cater to different individual preferences. However, the accessibility of the bedside pack will be an important consideration to promote patient driven access which incorporates the needs of those who are dependent for their mobility in busy hospital settings to reduce the impact of relying on busy staff.

In this study, some patients talked about negative experiences with staff who did not take the time to interact with them, staff who told patients they were too busy, or patients' perceptions of staff being impatient when engaging with them, which appeared to contribute to feelings of hopelessness. In the usual care hospital environment prior to implementing the CEE model, time limitations were identified by hospital staff as having a negative effect on their ability to engage in communication with patients (D'Souza et al., 2021a, Chapter 5). Staff also reported avoiding interactions with PWA if they felt unskilled or unable to support communication breakdowns (D'Souza et al., 2021a, Chapter 5). Within the current study, communication partner training was not provided to all ward staff, therefore patients interacted with both trained and untrained staff. Additionally, there were reductions in staffing levels during the data collection period which may have contributed to staff time pressures, and patients' perceptions of staff availability (D'Souza et al., 2021b, Chapter 6). Research suggests interactions with health professionals who lack training and skills in interacting with PWA can be disempowering and can increase the potential for adverse events in hospital (Manning et al., 2019). Previous studies have found that communication partner training can save time and reduce frustration for staff, reduce the burden of caring for PWA, reduce the risk of preventable adverse events and improve patients' overall health care experience (Hersh et al., 2016; Legg et al., 2005; McCabe, 2004; McGilton et al., 2009; Street et al., 2009). Therefore, it is essential to ensure all staff who

interact with PWA receive communication partner training to minimise the impact of unskilled staff on patient experiences and their long-term health outcomes.

Patient experiences, including communication and social opportunities, were different for each participant within the CEE model because of their individual levels of deficit or personal preferences. However, there were points of commonality in that patients largely perceived staff and volunteers as kind and friendly, and reported enjoying engaging in meaningful activity for those that were able to access the CEE model. Patients talked about feeling welcomed and enlightened by their experiences interacting with staff and volunteers, and largely viewed them as kind and caring. Patients valued staff who were willing to help, and appreciated being 'checked', something which patients perceived were behaviours staff "didn't have to do". Patients' perceptions of care during their stroke recovery appeared to be entwined with positive interactions and willingness by staff and volunteers to assist patients to engage in communication interactions and language activities. Patients also reported engaging in meaningful social interactions and activities while engaging in the CEE model initiatives including attending the afternoon tea, using the loaned electronic tablets to listen to audiobooks, participating in joint Speech Pathology-multidisciplinary therapy sessions, and talking with staff and volunteers within the talking program. Patients also described feelings of disappointment in missing out on social activities within the CEE model. For patients who were able to access the intervention, the CEE model appeared to provide opportunities to engage in enjoyable and meaningful activities and promote care through kind and friendly interactions with staff.

8.9 Strengths and Limitations

To our knowledge, this is the first study to investigate patient insights into their experiences in hospital following stroke with a CEE model implemented in usual care. This study assists in determining the value of a CEE model. This study provided valuable insights into patient experiences of communication interactions and language activities, and their perceptions of barriers and facilitators to engagement in the CEE model initiatives during their hospital admission with the CEE model implemented in usual care. Findings from this study will inform the ongoing development of the CEE model.

As this was a pilot study, there was a relatively small participant sample size. Future studies with larger sample sizes may provide a wider range of perspectives particularly given the factors influencing patient engagement in a CEE model may be different for each participant. Some participants had difficulty accessing the CEE model and were therefore less able to describe their experiences of the model. Additionally, the activities and experiences discussed by patients may be related to patients' broader experience of their admission and therefore may not be directly attributable to the CEE model specifically. This study was completed at a private hospital therefore the results may not be directly transferrable to other healthcare contexts.

8.10 Conclusion

This exploration of patient experiences with the CEE model embedded in usual care reveals the complex nature of accessing the CEE model in the hospital setting. Patients described variable experiences accessing different elements of the CEE model which were influenced by a range of individual patient factors, staff factors, hospital features as well as staff time pressures. For those who were able to access elements of the CEE model, they described positive opportunities for engagement in language activities. The CEE model was perceived to provide patients with opportunities to engage in meaningful language activities which appeared to positively influence their perceptions of their hospital admission. Despite the expected individuality of patient feedback, there were common findings which demonstrate that perceptions of care are entwined with positive interactions and willingness by staff and volunteers to assist patients to engage in meaningful activities. The findings of this study highlight the impact of the hospital ward environment on patient experience and demonstrate the potential for environmental interventions such as a CEE model to improve patient health care experience and stroke outcomes. However, further exploration of the feasibility and uptake of the intervention will need to be addressed within the hospital setting as the next step in exploring a CEE model in this complex setting.

Appendix K

The consolidated criteria for reporting qualitative studies: 32 item checklist (COREQ, Tong et al., 2007)

| Guide questions/description | | Location in manuscript |
|---|--|------------------------|
| Domain 1: Research team and reflexivity | | |
| Personal Characteristics | | |
| 1. Interviewer/facilitator | Which author/s conducted the interview or focus group? | Page 177 |
| 2. Credentials | What were the researcher's credentials? E.g., PhD, MD | Page 177 |
| 3. Occupation | What was their occupation at the time of the study? | Page 177 |
| 4. Gender | Was the researcher male or female? | Page 177 |
| 5. Experience and training | What experience or training did the researcher have? | Page 177 |
| Relationship with participants | | |
| 6. Relationship established | Was a relationship established prior to study commencement? | Page 177 |
| 7. Participant knowledge of the Interviewer | What did the participants know about the researcher? E.g., personal goals, reasons for doing the research | Page 178 |
| 8. Interviewer characteristics | What characteristics were reported about the interviewer/facilitator? E.g., Bias, assumptions, reasons and interests in the research topic | Page 178 |
| Domain 2: Study design | | |
| Theoretical framework | | |

| | | |
|--|---|------------------------|
| 9. Methodological orientation and Theory | What methodological orientation was stated to underpin the study? E.g., grounded theory, discourse analysis, ethnography, phenomenology, content analysis | Page 171 |
| Participant selection | | |
| 10. Sampling | How were participants selected? E.g., purposive, convenience, consecutive, snowball | Page 172 |
| 11. Method of approach | How were participants approached? E.g., face-to-face, telephone, mail, email | Page 173 |
| 12. Sample size | How many participants were in the study? | Page 173 |
| 13. Non-participation | How many people refused to participate or dropped out? Reasons? | Page 173 |
| Setting | | |
| 14. Setting of data collection | Setting of data collection Where was the data collected? E.g., home, clinic, workplace | Page 178 |
| 15. Presence of non-participants | Was anyone else present besides the participants and researchers? | Page 178 |
| 16. Description of sample | What are the important characteristics of the sample? E.g., demographic data, date | Table 11, page 173-174 |
| Data collection | | |

| | | |
|------------------------------------|---|---------------------|
| 17. Interview guide | Were questions, prompts, guides provided by the authors? Was it pilot tested? | Table 13, page 179 |
| 18. Repeat interviews | Were repeat interviews carried out? If yes, how many? | No |
| 19. Audio/visual recording | Did the research use audio or visual recording to collect the data? | Page 178 |
| 20. Field notes | Were field notes made during and/or after the interview or focus group? | Page 178 |
| 21. Duration | What was the duration of the interviews or focus group? | Page 178 |
| 22. Data saturation | Was data saturation discussed? | No |
| 23. Transcripts returned | Were transcripts returned to participants for comment and/or correction? | No |
| Domain 3: Analysis and findings | | |
| Data analysis | | |
| 24. Number of data coders | How many data coders coded the data? | Page 179 |
| 25. Description of the coding tree | Did authors provide a description of the coding tree? | Figure 11, page 180 |
| 26. Derivation of themes | Were themes identified in advance or derived from the data? | Page 179 |
| 27. Software | What software, if applicable, was used to manage the data? | Page 179 |
| 28. Participant checking | Did participants provide feedback on the findings? | No |
| Reporting | | |

| | | |
|----------------------------------|---|--------------|
| 29. Quotations presented | Were participant quotations presented to illustrate the themes/ findings? Was each quotation identified? E.g., participant number | Page 181-186 |
| 30. Data and findings consistent | Was there consistency between the data presented and the findings? | Page 180-186 |
| 31. Clarity of major themes | Were major themes clearly presented in the findings? | Page 180-186 |
| 32. Clarity of minor themes | Is there a description of diverse cases or discussion of minor themes? | Page 180-186 |

Foreword to Chapter 9

Title of publication: Staff and volunteer perceptions of a Communication Enhanced Environment model in an acute and a rehabilitation hospital ward: A qualitative description study within a before-and-after pilot study.

Authors: D'Souza, S., Ciccone, N., Hersh, D., Janssen, H. Armstrong, E., & Godecke, E.

Author contributions: All authors designed the study and the protocol. SD conducted participant recruitment, interviews, transcriptions and data analysis. NC completed the second review of the qualitative themes. SD wrote this manuscript. DH, EG and NC worked with SD in the development of the final version of this manuscript. All authors contributed to manuscript editing and approved the final manuscript.

This article is under initial review in Disability and Rehabilitation.

This chapter reports on the qualitative investigation conducted in the after phase exploring hospital staff and volunteers' perceptions of the CEE model and their experiences implementing the intervention. This chapter addresses research question v. 'what is the experience of implementing a CEE model for staff working with patients following stroke within an acute and a rehabilitation ward?'

Chapter 10 compares staff perspectives discussed in this chapter (after phase) to staff perspectives reported in Chapter 5 (before phase) to answer research question iv. 'following the implementation of a CEE model, is there a difference in how staff perceive their knowledge of, skills with, and attitudes towards communication and aphasia?'.

Chapter 9. Research Question v. Results: After Phase Staff and Volunteer Qualitative Data

Abstract

Chapter 9 has been published as:

D'Souza, S., Ciccone, N., Hersh, D., Janssen, H., Armstrong, E., & Godecke, E. (2021). Staff and volunteers' perceptions of a communication enhanced environment model in an acute/slow stream rehabilitation and a rehabilitation hospital ward: A qualitative description study within a before-and-after pilot study. *Disability and Rehabilitation*. Advance online publication. <https://doi.org/10.1080/09638288.2021.1977397>

The green open access version of the article will be available at
<https://ro.ecu.edu.au/ecuworkspost2013/11553/>

Chapter 10. Research Questions iii. and iv. Results: Comparisons of Before-and-After Phases

The CEE model sought to increase patient engagement in language activities and increase staff knowledge of, skills with, and attitudes towards communication and aphasia. While previous chapters have captured patient and staff attitudes and experiences at various time points in this study, this current chapter aims to answer the research questions which focus on changes over time from a qualitative perspective. Therefore, the focus of this chapter is to answer research questions iii. ‘what are the differences in patients’ experiences of communication in a CEE model compared to patients’ experiences of communication in a usual care ward environment?’ and iv. ‘following the implementation of a CEE model, is there a difference in how staff perceive their knowledge of, skills with, and attitudes towards communication and aphasia?’.

In order to address these research questions, the before-and-after phase qualitative data reported previously has been compared with regard to: patient experiences of communication; and staff perceptions of their knowledge, skills and attitudes towards communication and aphasia. To determine similarities and differences in patient experiences in usual care and when exposed to the CEE model, the perspectives of the control group patients were analysed in conjunction with the perspectives of the intervention group patients (reported in Chapter 8). Additionally, to explore differences in staff perceptions of their knowledge of, skills with and attitudes towards communication and aphasia before-and-after implementing the CEE model, staff experiences in the before phase (reported in Chapter 6) were analysed in conjunction with after phase staff interviews and focus groups (reported in Chapter 9). The following provides a summary of these qualitative data comparisons.

10.1 Patient Experiences Before-and-After the Implementation of the CEE model

Staff were perceived as kind and friendly before-and-after the CEE model was implemented

Both the control and intervention group patients perceived staff as friendly as they offered help and were happy and kind during interactions with patients. This appeared to

contribute to positive perceptions of their hospital care and experiences. The control group described staff as friendly, pleasant, softly spoken and polite:

Very pleasant. I don't complain of no one [sic]... their voices is [sic] very soft... they don't raise their voices, they [sic] very polite, very polite. (PWOA2)

Similar perceptions were reported by the intervention group who also perceived staff as younger, freer, happy and willing to help:

People in here are fantastic, they really are... they always check to make sure you're alright, always willing to help. (PWOA5)

The intervention group appeared to have access to a greater variety of meaningful language activities in comparison to the control group

When making comparisons to the control group, the intervention group appeared to have access to a greater variety of meaningful language activities as a result of exposure to the CEE model. Control group patients reported communication opportunities that were predominantly related to interactions with visitors and volunteers, reading books and using their personal electronic devices. However, some control group patients also described a lack of opportunity for interactions. PWA1 was the only patient who was in a shared room and appeared to use this as an opportunity to speak to the other patient, otherwise he reported that he did not engage in much activity in his room. When asked about what kind of activities patients had been engaging in outside of therapy, PWA1 responded, "bugger all... oh you talk to the bloke next door to you, whoever is available". Responses from other control group patients included "nothing" (PWA3) and "what little [communication] I've done has been easy... I've not really been in that close contact with [people] most of the [sic], most of the time" (PWOA4). PWA2 described reduced opportunities to engage in activity and interactions were associated with feelings of loneliness, "Ah, I'm feeling a bit remote".

The intervention group exposed to the CEE model described opportunities to engage in a variety of meaningful language activities often involving personal interactions. This

included the volunteer talking program, loaned tablets to listen to audiobooks, and the weekly afternoon tea.

I found it quite enlightening to get my point across from [sic] to someone that works at the hospital as a volunteer. It was quite interesting and they seem[sic] interested in me... it made me feel more receptive to them because they seem [sic] to be interested in me [volunteer talking program]. (PWA6)

Both control and intervention group patients reported co-location with other patients provided opportunities for interaction. Some control and intervention group patients expressed a desire to be co-located, however this was highly individual. In the control group, PWA1 valued opportunities to interact with another patient in a shared room. PWA2 reported a desire to be co-located with other patients to process feelings associated with experiencing a stroke, “[there’s] something collective, that’s what human beings are put together for ... sitting around talking... over the proverbial cuppa”. In contrast, the control group patients who had attended to communal dining reported they did not want to attend again (PWA4, PWA3).

Comparisons of control and intervention groups’ experiences of communal dining could not be made as the intervention group did not have access to communal dining, which was the result of staffing changes and the ward move (detailed in Chapter 7). However, the majority of intervention group patients who attended the afternoon tea reported enjoying this opportunity for social interactions with other patients: “I’ve been, um I’ve been meeting with people socially, a couple of very nice people and chatted, mainly they’ve chatted. Haven’t [sic] been much to it but I listen to it quite a bit ... oh it’s very nice, very social” (PWA5). Additionally, the desire to be co-located and attend the CEE model afternoon tea was evident for one intervention group patient who was not able to attend and reported a lack of social activity with other patients.

Well, I don’t communicate a lot, though they have these afternoon teas, but I’ve never been in a position to go to one [because of scheduled Physiotherapy sessions], so the only time I communicate with other patients is at the physio [Physiotherapy]

sessions and they're all business, so mostly, it's mostly the nurses I communicate with. (PWOA5)

Factors influencing patient engagement in activities before-and-after implementing the CEE model: Patient factors

Individual patient factors were evident across the control and intervention patient groups. This appeared to influence their desire and motivation to participate in activity, and engagement in language activities and communication interactions. These individual patient factors included their: age; communication style; desire to engage in communication; and perception of the benefit of communal dining. In the control group, PWA2 described "talking" as his hobby. He also reported attending a writing group on a regular basis prior to his stroke. This appeared to contribute to his desire to engage in social interactions with other patients which was likely to have been exacerbated by being in a single room with a limited number of visitors. However, PWOA1 felt that other patients were older than her and were more reserved in their personalities and communication styles, therefore she was not interested in engaging with them socially.

They [patients attending communal dining] seem a lot older and um, a lot of them are reserved and quiet as well and I suppose if there was someone more my age it would be different, or younger, it would be different. (PWOA1)

Intervention group individual patient differences also appeared to have an impact on their engagement with elements of the CEE model. For example, PWA5 enjoyed socialising and sought out social interactions, "Well, I'm an old chatter box". However, PWA6 did not personally like the Apple brand which resulted in him declining a loan of the electronic tablets offered in the CEE model.

Both control and intervention group patients perceived feelings of lethargy, laziness, tiredness and low mood limited their desire to engage in activity outside therapy times. Both patient groups also described their physical limitations and communication disorders as factors that negatively influenced their ability to engage in language activities. Control and intervention group patients described how their communication impairment, such as aphasia or dysarthria, impacted their ability to communicate with other patients and staff.

Some patients became more passive communicators as a result, opting to refer to family members to communicate on their behalf: “I don’t do a lot of communication... my daughter does most of it... no, my voice isn’t as good” (PWA3). Other patients utilised communication strategies prescribed by their speech pathologist to facilitate communication.

I’ve had the speech person here and I [sic] she told me to think about what I’m saying and pronounce it properly so that’s what I’m trying to do. (PWOA3)

Both patient groups described their physical limitations such as reduced mobility, and hearing and communication impairments, affected their autonomy and independence, and restricted their opportunities to engage in language activities. This often resulted in reliance on hospital staff to assist their engagement in activities. Patients in both groups also described modifying the physical environment to promote access to activities in their room. However, this was only reported by one patient in the control group (PWOA1) and one patient in the intervention group (PWOA6).

I’ve done that, got my husband to shift the phone... (PWOA1)

I don’t need to call people to come to get something... the phone, so if it’s facing that way and I’m sitting this side, I can’t reach that side, so every time I make sure it’s facing me and that I can reach. (PWOA6)

Factors influencing patient engagement in activities before-and-after implementing the CEE model: Staff factors

Control and intervention group patients described their reliance on staff to engage in activity. Staff acted as a facilitator and a barrier to engaging in activity. One control group patient described being reliant on staff as she often forgot to ask her husband to move items in her room to be within reach which resulted in her calling staff to assist.

I’d asked them [nurses] to get a pen and paper for me I’d left it sitting over there... I could have got my husband to put it across, but I’d forgotten hundreds of times (PWOA1).

Intervention group patients also described relying on staff to facilitate their engagement in elements of the CEE model such setting up hearing aids (PWA4), charging or explaining how to use a tablet (PWA7), and running the afternoon tea (PWA7, PWA8). This theme was more prevalent for patients who were more physically dependent and reliant on staff.

The control and intervention group patients' engagement in language activities was perceived by patients to be influenced by individual staff qualities such as: their accents; whether they were perceived as being friendly; whether they gave time to interactions with patients despite being busy; whether they prioritised other clinical tasks; or whether or not they were perceived as patient.

Some of the staff are willing to understand and give you time to formulated [sic] what you want to say, so that's good... some people, they don't have the patience (PWA6).

Factors influencing patient engagement in activities before-and-after implementing the CEE model: Hospital factors

Some of the control and intervention group patients discussed the power imbalance in hospital, feeling as though they had to follow the rules, limiting their ability to freely engage in activities beyond their room: "I was in the hospital, so I think I had to stick into [sic] the room, to the rules" (PWOA2). Some of the intervention group patients also talked about challenges accessing the environment beyond their room, as they perceived they needed to stay in their rooms so staff could keep track of them.

There's a lot that I wish I could have been doing, I mean walking around the building talking to people, having a coffee, a bad coffee, or just going outside amongst the trees listening to the breeze, but I can understand why they want to keep people like me contained because they want to keep track of me and what's going on. (PWA6)

Control and intervention group patients' perceptions of staff time pressures were evident in both study conditions. This may have been the reflection of staff time constraints,

or patient perceptions that staff were busy. Patients described about how staff were “rush[ing]” (PWA6) and “buzzing around” (PWOA7) which contributed to their perception of them being busy. Patients also reported that staff told them they were busy. Patient experiences of staff time constraints appeared to be related to staff individual factors such as how staff responded in a busy environment, as well as hospital related factors such as the reduction in the nurse-to-patient ratio that occurred during the study.

10.2 Summary: Comparisons of Control and Intervention Groups’

Experiences

Patient experiences before-and-after implementing the CEE model were similar in that the control and intervention groups both had access to language activities, however the intervention group had access to a wider variety of meaningful activities. It is important to note (as reported in Chapter 8) that patients in the intervention group were asked specifically about elements of the CEE model they were exposed to, therefore this may have elicited increased reports of the variety of language activities they engaged in. Patient experiences, perceptions of, and reactions to opportunities to engage in language activities in the before-and-after phases were highly individual. For example, some control and intervention group patients perceived that co-location provided opportunities to interact with other patients where some patients expressed a desire to be co-located, while others reported a preference to avoid communal dining or social interactions with other patients. Differences in each patient’s personality, functional status and stroke related deficits, and their reactions to these deficits, appeared to influence their desire and motivation to participate in activity, and their levels of engagement in language activities. For example: whether they had social personalities; their personal preferences or familiarity with technology; mood or levels of fatigue; physical or communication limitations and their reactions to these deficits; and their initiative to modify the physical environment to facilitate access to activities.

The control and intervention group patients both perceived staff as friendly as they offered help and were happy and kind during interactions with patients which contributed to their positive perceptions of care. This is consistent with previous research that suggest positive interactions with health staff improve relationships between health staff and

patients, and can assist PWA to feel empowered to manage their long-term care (Legg et al., 2005; Manning et al., 2019; McCabe, 2004; McGilton et al., 2009; Street et al., 2009). These results lend to the argument to shift from the medical model of patient care to the World Health Organization International Classification of Functioning, Disability and Health approach in stroke hospital care (World Health Organization, 2001). This approach considers the broader environment and how it can influence patient health following stroke in hospital such as: the social and physical immediate surrounds as well as the broader environment, including formal and informal systems; the health care setting; and the skills, values and attitudes of health care providers; services, systems and policies (World Health Organization, 2001).

Control and intervention group patients described their reliance on staff to engage in activity. Staff acted as a barrier and a facilitator to engagement in activity, and not all experiences with staff were positive. Individual qualities of staff influenced patient engagement in language activities such as: their accents; whether they were perceived as being friendly; whether they gave time to interactions with patients despite being busy or whether they prioritised other clinical tasks; or whether or they were perceived as patient. This was evident for both groups. The power imbalance between staff and patients in hospital influenced patients' ability to access communication opportunities before-and-after implementing the CEE model. Patients' perceptions of staff time pressures in the before-and-after phases also negatively impacted patient engagement in activity. Previous studies investigating an EE model found that patients with reduced mobility were more: reliant on staff to engage in activities; likely to be restricted to activities at their bedside; and likely to report feelings of boredom (White et al., 2015). Previous studies investigating animal and human EE models focussed on promoting voluntary engagement in activity through increased opportunities for activity. However, communication is an interactive activity that requires a communication partner. Therefore, this may have contributed to patients' reliance on staff to engage in communication interactions. Furthermore, PWA may need supportive strategies or modification of activities as a result of aphasia related deficits, therefore some elements of the CEE model inherently relied on others to facilitate patient engagement, such as the weekly afternoon tea, the talking program or loaned electronic tablets. In order to address this, future studies of a CEE model may benefit from providing a bedside pack with individualised activities, or promoting patients' access and use of their

own electronic devices, to reduce the reliance on staff to facilitate engagement in some language activities.

10.3 Differences in Staff Knowledge of, Skills with, and Attitudes towards Communication and Aphasia following the Implementation of a CEE model

After the implementation of the CEE model, staff reported having increased knowledge, skills and confidence in communicating with PWA using supportive communication strategies and resources

Positive changes in staff knowledge of aphasia and skills with communication were evident after staff attended the CEE model training and implemented the model. Although some staff in the before phase reported awareness of resources and skills to support communication interactions with PWA, most staff reported a lack of knowledge, skills and confidence in engaging in communication interactions with PWA: “I find it challenging... knowing how the best way to communicate with that person [with aphasia]” (SW2). Staff reported feeling anxious about encouraging patients to communicate as communication breakdowns may cause stress and anxiety for the patient and the staff member: “I feel like I don't know where else to go. I don't know if [sic] other things that could help us” (PT2). Staff reported a lack of confidence in their ability to repair communication breakdowns which resulted in increased time pressures in their treatment sessions, often leading them to avoid encouraging communication interactions. They also described their perception of the negative effect a mixed hospital ward had on the acquisition of stroke specific specialist skills: “having a stroke specific ward... everybody on the ward would be trained...” (OT4).

I find it challenging... [they] become very frustrated and not [sic] have the tools themselves to communicate back to me and you would never want to leave someone in that space. So that's something that I struggle with. (SW2)

In comparison, after the implementation of the CEE model, staff reported they initiated communicative interactions they might have otherwise been hesitant about: “[We have] better interaction [sic] now, I suppose because we're not so afraid to deal with them [PWA]” (RehabN2). They reported they had the ability to support and repair communication

breakdowns with PWA and patients with other communication impairments. Staff also described feeling equipped with the knowledge, resources and confidence in how to deal with communication breakdowns: “being more mindful to give them [PWA] additional time so that they can respond... knowing it’s not a cognitive issue, it’s a speech issue and they are just taking time to get their words out...” (PT6).

Staff reported incidental interactions with speech pathologists assisted them in using supportive communication strategies however in the after phase, this occurred regularly within the joint speech pathology-multidisciplinary sessions within the CEE model

Staff in the before phase reported support and education from Speech Pathology staff facilitated their ability to interact successfully with PWA: “I had a patient who had word finding difficulties... I just was observing the speechie [speech pathologist] ... it’s something I could have just added to my session” (PT4). Staff in the after phase also reported speech pathologists aided them in the use of communication supporting strategies, however this occurred regularly through the CEE model joint Speech Pathology-multidisciplinary sessions. This was perceived to increase the effectiveness and productivity within rehabilitation sessions. Staff perceived these sessions allowed them to provide higher quality rehabilitation, such as providing more rehabilitation activities in a session as a result of increased efficiency, improved patient-professional relationships and improved understanding of patient needs.

The patient didn’t seem like they were understanding me, I couldn’t really understand them. That was quite good to do that joint session [with a speech pathologist] and work out what was going on, what were the best cues, what they meant or how to get them to understand me... it just meant our sessions were more effective because then we had a better means of communicating so we could actually get more done... I think it made our sessions more productive and we were able to achieve more. (PT7)

The CEE model appeared to be associated with increased staff awareness of how to use communication supporting strategies and access resources

Staff in the before phase discussed the use of communication strategies and resources to facilitate communication on the ward for patients with a variety of communication impairments. However, some staff reported they were uncertain how to access communication resources: "...maybe there's things out there that I don't know about that would help us communicate with these patients" (PT2). In the after phase, staff reported they were aware of communication supporting resources that they could access without the support of ward speech pathologists: "It's good and there are things I didn't know before that I wouldn't have done before" (RehabN1).

I found the training really helpful... what techniques or how we could not overwhelm or distress, so really taking a step back, um when seeing those communication [tips] boards and then being able to say okay these are some of the cues... (SW1)

Staff in the after phase reported the CEE model promoted patient engagement in stroke rehabilitation and reduced frustration during communication interactions for hospital staff and PWA. Hospital staff perceived the use of trained communication strategies and resources improved the efficiency of their therapy sessions as a result of improved communication exchange within treatment activities and patient care.

Communication is slightly easier, so the frustration level for them [patients] is less, I guess. If we are using those tools then you find that you are getting your answers faster... it saves time, it is something that's faster for both patient and I think for us when we use it. (AcuteN1)

Positive differences were seen in staff attitudes towards communication and aphasia after the implementation of the CEE model

Positive differences in staff attitudes towards communication and aphasia were evident after staff attended the CEE model training and implemented the CEE model on the participating wards. In the before phase, staff talked about the nature of interactions with patients as often being driven by the patient's care, restricting opportunities for

communication beyond this context: "... very often care is very [sic] directed from a medical health care perspective" (SP4). One staff member perceived communication as a task separate from the responsibility of their role, therefore limiting their facilitation of communication opportunities for patients following stroke: "They [speech pathologists] do their bit and we do ours... we don't have time to practise speech with them" (RehabN1). Individual staff factors were perceived to either promote or limit communication opportunities for patients, such as differences in personalities, values and attitudes. This included staff engaging in incidental social interactions with patients during routine tasks.

Following the implementation of the CEE model, staff demonstrated an attitude of valuing social interactions and opportunities for embedding communication within usual care tasks and rehabilitation activities: "... you're not just dictating what you want them to [do]... and then too making them speak as well, so actually giving them time and actually wanting them to respond...." (PT6). Staff described a shared responsibility of communication within the multidisciplinary team, perceiving communication as being part of the broader team's role, rather than the sole responsibility of the ward speech pathologist.

I definitely think it's a step in the right direction. Even though we all have great relationships with the rest of Allied Health it's kind of glued us a little bit stronger together, we're not just thinking well that's their role, they're going to do this. Just being more involved... I think it's probably made coordinating with speechies [speech pathologists] and like everyone in the team being a little bit more of a team when we're managing [patients following] strokes instead of just having each person coming in to do their little area. (PT6)

Staff reports in the after phase demonstrated an attitude towards valuing holistic patient care. They perceived factors beyond medical and physical limitations were important, such as social opportunities and engagement with staff.

Um, I think prior to the training I was more like "we're going to do this, we are going to do this, we are going to do this, are you okay with it?" but now I'm going a little bit more in depth into my communication, so asking them specifically about their symptoms, how they feel they are doing, communicating more with them. So,

explaining things a bit more with them, as opposed to going in as a clinician and being like this is the impairment, we need to do this. I'm explaining why and what to expect, what treatment may feel like and what the outcomes may or may not be (PT2)

I have noticed the nurses referring to the [communication tips] board and tending to, they tend to use the strategies that are up there when they are talking to the patients ... I think just adding to that it allowed [them] to recognise it's not just up to the speech pathologist to do the communicating, they had a bit more ability to do that as well (SPM)

If they went to [the] speech afternoon tea... because they didn't have speech issues it didn't count as their therapy... so that's when priorities were like they have to go to physio [Physiotherapy] and that's sad because... I think they would have still got benefit not just physically but ... they're happier on the ward, like social is important... (PT6)

Staff discussed their perceptions that improved communication with patients assisted them in their roles within the team. This was the result of improved patient-professional relationships and increased understanding patients' needs within rehabilitation sessions and nursing interactions.

If you can find a better way to communicate with them and kind of have it be a two-way conversation rather than us just saying things to them and assuming there's not going to be a response, we can get some kind of response. They are on board a bit more with what you are going to do, and you can find out things that they like and don't like, and it makes it a bit more of a meaningful session than the physical part of it. (PT5)

10.4 Summary: Comparisons of Staff Knowledge of, Skills with, and Attitudes towards Communication and Aphasia Before-and-After Implementing the CEE model

Positive differences in staff knowledge of, skills with, and attitudes towards communication and aphasia were evident after staff implemented the CEE model. Some staff in the before phase reported awareness of resources and the ability to support communication interactions with PWA. However, in contrast, many staff reported a lack of knowledge, skills and confidence in these interactions. They reported often avoiding interactions with PWA within treatment sessions and nursing care as a result. Some staff reported they were not aware of resources that were available to them nor how to access them within the hospital setting. One staff member stated that communication was not part of their role and so it appeared that they felt supporting communication with patients was not their responsibility. Following the implementation of the CEE model, staff in the after phase perceived the CEE model and aphasia training and resources equipped them with the knowledge, skills and confidence to support interactions with PWA. A large proportion of staff reported increased awareness of resources that could aid communication with patients and reported they had increased confidence in using trained strategies. Staff reported willingness to approach communication interactions with PWA as they felt they had the strategies and resources to repair communication breakdowns. Staff attitudes were different following the implementation of the CEE model, as members of the multidisciplinary team described communication as being part of their role. They sought the support of the ward speech pathologists within the CEE model joint therapy sessions to further develop their own communication skills. These results are consistent with previous research whereby communication partner training has been found to significantly improve staff knowledge of aphasia and their skills in using communication supporting strategies, as well as their attitudes towards communication (Horton et al., 2016; Jensen et al., 2015; McGilton et al., 2009). Communication training has been perceived by staff to save time and reduce the burden of caring for PWA and resulted in more accurate patient diagnoses, care, treatment, and improved patient outcomes (Bartlett et al., 2008; Hersh et al., 2016; Legg et al., 2005; McCabe, 2004; McGilton et al., 2009; Street et al., 2009).

Within the current study, the changes evident in staff attitudes towards communication and aphasia may have contributed to the successful implementation of the CEE model and the use of trained strategies and resources. Despite communication training increasing staff knowledge and skills in communication and aphasia, research found implementing a communication partner training program in the hospital setting was challenging, particularly in the acute care context (Simmons-Mackie et al., 2007). This was attributed to staff attitudes and beliefs patients were “not ready” (p. 55) for communication access (Simmons-Mackie et al., 2007). Additionally, staff reported the perception that training was not applicable to the acute context as a result of: short hospital length of stay; limited time and the rapid work pace; and the focus on the medical model of patient care (Simmons-Mackie et al., 2007). The limited success of the training program was also attributed a lack of opportunity for staff to implement and use trained strategies, which resulted in limited tangible success (Simmons-Mackie et al., 2007). This was perceived to further reinforce negative beliefs about the suitability of the communication training program in the acute setting (Simmons-Mackie et al., 2007). The rehabilitation setting was reported to experience more success implementing and using the trained strategies and resources (Simmons-Mackie et al., 2007). This was attributed to: staff experiences of success, which positively reinforced the use of trained strategies and resources; organisation and leadership support; as well as opportunities to meet and work as a multidisciplinary team (Simmons-Mackie et al., 2007). This suggests that ward culture and staff attitudes are an important component to behaviour change interventions and highlights that developing staff knowledge and skills in aphasia may not be enough to elicit meaningful change in this context.

Strategies that target changes in staff attitudes towards communication and aphasia could be considered an integral component of interventions that aim to enhance the communication environment in the hospital setting, such as communication partner training of the multidisciplinary team. Within the current study, differences in staff attitudes after the implementation of the CEE model was likely achieved through a number of factors. The use of an implementation science approach allowed researchers to collaborate with the hospital team to address barriers and promote facilitators to communication between patients and staff. The formulation of, and collaboration with, the CEE model working party in the development of the model allowed the intervention to be tailored to the needs of the

site. Additionally, leadership support and the hospital site champions on the ward may have further promoted the perceived benefit of the intervention and promoted the belief that the intervention was appropriate for the site. The use of an implementation science approach within the design of the study, as well as behaviour change strategies embedded within the training program, may have also promoted staff buy in to the CEE model intervention, relationship building with the research team, and culture change on the wards. The provision of accessible resources such as the communication tips boards, the communication support packs, and communication support posters displayed on the wards may have also provided environmental prompts for staff to use the trained strategies and resources. Additionally, the training was provided by a credible source, a speech pathologist with experience in the acute care and rehabilitation hospital settings, which may have further promoted the perceived credibility of the research team and the suitability of these strategies and resources for the ward setting. This highlights the high value of considering implementation science and behaviour change strategies in training programs that target changes in usual care practices. These results add to the literature in regard to factors that may contribute to the uptake of a complex behaviour change intervention such as communication partner training in the hospital setting. This can be promoted through the: exploration of barriers and facilitators to staff-patient communication; provision of accessible and relevant resources; and use of behaviour change and implementation science frameworks.

Chapter 11. Discussion

11.1 Summary of Aims

This study sought to develop, implement, and investigate a Communication Enhanced Environment (CEE) model in an acute and rehabilitation ward in order to build on the framework of an enriched environment (EE) and the early work exploring a communication enriched environment. The CEE model built on the foundations of research from communication access, social approaches to communication, and communication partner training to enhance the hospital ward environment to provide more opportunities for patients with aphasia (PWA) and without aphasia (PWOA) following stroke to engage in language activities.

A summary of the key findings according to the research questions of this study are addressed below:

i. **Can a CEE model be implemented in a hospital ward setting?**

As reported in Chapter 6, at the time of patient observations for each recruited participant, 71% of the CEE model was reported to be available to the intervention group. More specifically, 93% of the model was available to PWA, and 42% of the model was available to PWOA. There were several unforeseen factors that occurred in this study that may have influenced the implementation of the CEE model. This included the reduction in: stroke admissions at the hospital site; the nurse-to-patient ratio; the ward reconfiguration; and access to communal dining. The reduction in the number of stroke admissions to the site had the potential to influence opportunities for staff to integrate the CEE model in usual care. However, hospital site champions' monitoring of the availability of the CEE model may have acted as a prompt for staff to re-engage with the model for each recruited participant. Therefore, these results may not reflect a true audit however might be considered a useful strategy to promote uptake and re-uptake of a CEE model. The intervention group had reduced access to communal areas in comparison to the control group. This was the result of the acute ward moving during the implementation phase to become a combined acute and slow stream rehabilitation ward, which did not have a communal area. The reduction in nurse-to-patient ratio that occurred during this

study may have also limited nurses' availability to transfer participants to communal areas, as well as set up or facilitate language activities for participants in the intervention group. Additionally, the qualitative outcomes (explored later in this discussion) provide further insights into factors that influenced patient engagement in the CEE model, and staff implementation and use of the CEE model.

The factors that occurred during the study period that may have affected the implementation of the CEE model are in line with previous research investigating the implementation of best practice guidelines (Ploeg et al., 2007) and the implementation of an EE on acute and rehabilitation wards (Rosbergen et al., 2017b; White et al., 2014). Within this study, the use of implementation science frameworks allowed a systematic approach to identifying and addressing barriers to patient engagement in language activities where possible, as well as promoting facilitators to behaviour change (Graham et al., 2006; Michie et al., 2011; Michie et al., 2015). This included conducting: i) a problem analysis; ii) an assessment for readiness for change; iii) an assessment of barriers to knowledge use, and iv) adapting knowledge to the local context, while considering the capability of individuals, opportunities in the hospital context, and staff motivation to drive behaviour change. However, despite the use of this approach, unforeseen circumstances occurred during the study period. These events were beyond the control of the research team and demonstrate the everchanging and challenging nature of the hospital environment. Therefore, it may be essential to anticipate and address factors that can be identified in advance, as well as recognise those unexpected challenges as they occur during the study process. These factors can then be explored, integrated, monitored and reported, rather than controlled, to promote the feasibility of ward-based intervention within the real-world hospital context. Interventions that target behaviour and system level changes are challenging in the hospital context (Horton et al., 2016; Simmons-Mackie et al., 2007) and warrant the argument that we first need to explore the question of feasibility and further investigate patient access to the CEE model within the hospital ward environment during their early stroke recovery before we can explore the question of effectiveness.

ii. Does a CEE model influence the amount of time patients following stroke spend engaging in language activities?

The publication in Chapter 6 reported that the intervention group engaged in a higher, but not significant, proportion of language activities (600 of 816 observation time points, 73%) than the control group (551 of 835 observation time points, 66%). The factors discussed above that may have influenced the implementation of the CEE model may have also reduced intervention groups' engagement in language activities. Additionally, PWA in the intervention group had a higher number of average days in a single room than the control group. Whilst this CEE model did not significantly increase patients' engagement in language activities, the trend towards higher levels of engagement in language activities in the intervention group despite these contextual constraints, are in line with similar models of activity promotion such as an EE (Janssen et al., 2014b; Rosbergen et al., 2017a). Although our findings are not significant in this particular context, these results still demonstrate the potential of a CEE model to positively influence patient engagement in language activities in hospital early after stroke. This intervention utilised previous research exploring: the framework of EE; a communication enriched environment; communication access; social approaches to communication; and communication partner training. This study also highlights the complex and dynamic nature of a hospital environment which should be considered in future research investigating environmental interventions in this context.

iii. What are the differences in patients' experiences of communication in a CEE model compared to patients' experience of communication in a usual care ward environment?

As reported in Chapter 10, patient experiences in hospital before-and-after the CEE model was implemented in usual care were similar in that the control and intervention groups both perceived staff as kind and friendly, which contributed to their positive perceptions of care. Both patient groups had access to language activities, however the intervention group appeared to have access to a wider variety of meaningful activities. It should be noted that patients in the intervention group were asked specifically about elements of the CEE model they were exposed

to, therefore this may have elicited increased reports of the variety of language activities they engaged in.

As Chapter 8 highlights, the intervention group described variable experiences accessing different elements of the CEE model. However, for those who were able to access elements of the model, they predominantly described positive opportunities for engagement in language activities. Additionally, patient experiences, perceptions of, and reactions to opportunities to engage in language activities in the before-and-after phases were highly individual. Patient factors influenced their engagement in activities before-and-after implementing the CEE model, such as differences in personality, as well as their functional status and stroke related deficits, and different reactions to these factors. Both patient groups perceived their reliance on staff as a factor that influenced their engagement in activities, which largely affected those who were more dependent for their mobility. The control and intervention group patients also perceived hospital factors, such as the power imbalance between staff and patients, and staff time pressures, as barriers to their engagement in activities. These results are in line with patient experiences where EE was embedded in usual stroke care (White et al., 2015). Patients with reduced mobility who were exposed to an EE were more: reliant on staff to engage in activities, such as transferring into communal areas; likely to be restricted to activities at their bedside; and likely to report feelings of boredom (White et al., 2015). This highlights the need to further develop the CEE model to offer a wider variety of language activities, including those that can be engaged in independently and at the patient's bedside. This may reduce the reliance on time poor staff and promote patient driven activity, particularly for those who are mobility dependent. The CEE model included: supported communication training; social opportunities for patients; increased staff and volunteer access to communication supporting resources and activities; and conversations with trained volunteers. These results suggest that these changes to hospital ward had a positive impact on the quality of meaningful interactions between patients and hospital staff and volunteers, and positively contributed to patients' perceptions of their stroke care.

iv. Following the implementation of a CEE model, is there a difference in how staff perceive their knowledge of, skills with, and attitudes towards communication and aphasia?

As reported in Chapter 10, positive differences were evident in how staff perceived their knowledge of, skills with, and attitudes towards communication and aphasia following the implementation of the CEE model. In the before phase, some staff reported awareness of resources and the ability to support communication interactions with PWA. However, most staff reported a lack of knowledge, skills and confidence in engaging in communication interactions with PWA. One staff member within the multidisciplinary team also reported the perception that communication was not part of their role and therefore not their responsibility. Following the implementation of the CEE model, staff in the after phase described the CEE model and aphasia training and resources equipped them with the knowledge, skills and confidence to support interactions with PWA. Staff reported willingness to approach communication interactions with PWA as they had the knowledge, skills and resources to repair communication breakdowns. Staff also reported they used the knowledge, skills and resources gained from the CEE model and aphasia communication partner training to support the communication needs of other patients with communication impairments. Additionally, the multidisciplinary team described communication as being part of their role and sought the support of the ward speech pathologists within the joint Speech Pathology-multidisciplinary sessions to further develop their own communication skills. These results are consistent with previous research whereby communication partner training improved staff knowledge of aphasia, their skills in using communication supporting strategies, and their attitudes towards communication (Horton et al., 2016; Jensen et al., 2015; McGilton et al., 2009). These results highlight the value of a CEE model in contributing to positive differences in staff knowledge of, skills with, and attitudes towards communication and aphasia. Additionally, they demonstrate the potential of a CEE model in promoting patient care through communication trained staff providing increased communication access and opportunities to engage in language activities and social interactions.

v. What is the experience of implementing a CEE model for staff working with patients following stroke within an acute and a rehabilitation ward?

As reported in Chapter 9, staff perceived a number of factors influenced the implementation and use of the CEE model, as well as patient engagement in different model initiatives. Staff perceived a number of hospital factors acted as barriers to implementing and using the CEE model such as: the reduction in stroke admissions to the participating wards; staffing changes; the hospital ward reconfiguration that occurred during the study period; and hospital logistics and policies. Staff perceived that staff and volunteer personal characteristics acted as a barrier or a facilitator to patient engagement in the CEE model. This included staff and volunteers' individual personalities and different levels of flexibility. Staff also perceived patient factors influenced patient engagement and use of the CEE model which included their: personalities and preferences, such as whether they had a social personality; levels of motivation; familiarity with technology; stroke related deficits; levels of fatigue; and rehabilitation demands.

Staff perceived the CEE model was easy to use in regard to the accessibility of resources, which promoted the acceptability and usability of the intervention. They reported that the CEE model and aphasia communication partner training was easy to understand. This allowed staff and volunteers to practise using the trained strategies and resources. They also perceived the majority of the CEE model initiatives required minimal logistical effort which facilitated the implementation and use of the model. This included the talking program, the communication tips boards, the communication partner training session and the communication support packs. Although staff perceived the implementation approach facilitated the implementation and use of the CEE model, such as the step-by-step implementation of the model, they also felt that more could have been done during the implementation process to promote further uptake and use of the CEE model. This included continuing the CEE model and communication partner training beyond the implementation period of the study, and the inclusion of a nurse champion. These results may inform the future development of implementation studies that aim to promote behaviour and culture change within the hospital setting, including future studies investigating a CEE model.

11.2 What are the Lessons Learnt?

Contextual issues are considered a common barrier which can limit the implementation of evidence in practice (Bauer & Kirchner, 2020) and are thought to contribute to the evidence to practice gap that is seen in stroke management (Lynch et al., 2018b). The use of implementation science frameworks allows a systematic approach to identifying and addressing barriers, as well as promoting facilitators, to behaviour change (Shrubsole et al., 2019). As an emerging area of stroke research, the lessons we learnt in the development and implementation of a CEE model in this study may contribute to the development and implementation of future ward-based behaviour change interventions.

11.2.1 It was Essential to Embed Implementation Science Strategies in the Design of the Study, and the Development and Implementation of the CEE model

The consideration of implementation science strategies in the development of the study design and the CEE model, as well as the implementation process, were an essential component of this research. This was because the CEE model inherently relied on the uptake of the intervention by hospital staff. Behaviour and system changes are challenging in the hospital context (Horton et al., 2016; Simmons-Mackie et al., 2007), particularly when the focus of an intervention involves a shift from a medical model of patient care to the approach used by the World Health Organization International Classification of Functioning, Disability and Health (World Health Organization, 2001) which considers the broader environment and how this influences patient health. The CEE model is a ward-based intervention which focusses on the hospital environment and involves all levels of the hospital system including: the physical hospital environment; resources and equipment; people within the environment; hospital policies and procedures; and the social culture and attitudinal environment. Therefore, the research team needed to establish an understanding of the environmental context. This included the system, the people within the system, and the barriers and facilitators to patient engagement in communication and language activities within the system. It was integral to consider these factors, and address or integrate them rather than control them as extraneous variables, in order to meet the needs of the real-world hospital ward environment. This approach resulted in 71% of the

CEE model implemented for the intervention group, despite the contextual challenges that occurred in the study period.

As discussed in Chapter 9, staff perceived a number of hospital events that occurred during the study period were barriers to implementing and using the CEE model. This included: the reduction in stroke admissions at the hospital site; the reduction in nurse-to-patient ratio; staff changeover; the ward reconfiguration; and the physical geography of the ward. These results are consistent previous research investigating the implementation of best practice guidelines (Ploeg et al., 2007) and the implementation of EE on acute and rehabilitation wards (Rosbergen et al., 2017b; White et al., 2014). The contextual challenges that occurred in this study potentially reflect the realities of the hospital environment. Many of these events were unavoidable and are likely to occur in studies that aim to embed interventions in usual hospital care.

Within the current study, staff perceived the CEE model was easy to use in regard to the accessibility of resources, which promoted the acceptability and usability of the intervention. Additionally, they reported that the CEE model and aphasia communication partner training was easy to understand. This may have been the result of the investment from staff and volunteers, and the use of implementation science and behaviour change principles, in the development and implementation of the CEE model. As a result, a CEE model was an intervention that aimed to be pragmatic, accessible and easy to use within a pressured and challenging hospital system. Additionally, the use of behaviour change strategies and implementation science approaches may have contributed to differences in staff attitudes towards communication and aphasia in the hospital setting. This was likely to have further promoted the uptake and use of the CEE model. Therefore, this approach may provide a framework for implementing hospital-based interventions to promote individual, ward, cultural and systems level change and address the evidence-based gap in clinical practice.

11.2.2 Strong Relationships and Teamwork Promoted Solving Problems

It was critical for the researchers to work with the hospital team to promote a coordinated approach in the development, implementation and evaluation of the CEE model. Within this study, relationships between the research team and the hospital team were imperative, but difficult to objectively measure, record and report. Positive and

collaborative working relationships within projects are arguably one of the key features of successful interventions, a factor that is often under-acknowledged and under-reported.

The research team used a number of strategies across the extended study period to build relationships with the hospital team. The author of this thesis is a qualified speech pathologist with clinical experience in acute and rehabilitation hospitals, which may have facilitated building a credible profile within the team. Additionally, the researchers had insight into the context of the hospital through their professional experiences within the hospital environment. As a result, they understood: the challenges staff faced; the pressures they experienced; and the context of the wider hospital system, processes, procedures and policies. This allowed the discussion of shared experiences, which further promoted relationship building and the development of collegial and collaborative relationships with hospital staff. Involving staff from the beginning of the study promoted the development of staff identity within the project as experts in their own environment who had valuable contributions and solutions to the problems and challenges they experienced. The researchers focussed on demonstrating the collaborative nature of the study. This was promoted by including site investigators as authors on study publications. Additionally, collaboration was also established by working with staff to develop solutions to their day-to-day challenges within the CEE model development. It was crucial that the hospital team felt heard and perceived the researchers understood the challenges they experienced. This was also potentially facilitated through the use of collaborative language that involved collating ideas which were proposed to the hospital team and developed ideas together. Hospital staff needed to feel comfortable with the research team in order to expose and discuss their areas of weaknesses and vulnerabilities. It was essential that the research team focussed on understanding problems, seeking different opinions and perspectives, and re-framing barriers, challenges and problems as opportunities to explore solutions. These factors contributed towards building a collaborative relationship that resulted in the development, implementation and evaluation of this ward-based intervention in a hospital environment despite a number of contextual challenges the site experienced. This demonstrates the value of building relationships with teams to foster collaborative working relationships to address barriers and promote solutions in the development and implementation of ward-based hospital interventions such as the CEE model.

11.2.3 The Site Champions were Crucial for the Successful Implementation of the CEE model

The site champion speech pathologist and physiotherapist were vital in this study. They provided the link between the research team and the hospital site. They advocated for the project and reminded staff about the CEE model on a regular basis. They were a consistent and reliable means of communication between the research team and hospital staff. They linked the research team with other key multidisciplinary team members to form the CEE model hospital working party. During the implementation phase, the site champions assessed for barriers to using the CEE model by actively seeking feedback from the multidisciplinary team and relaying this to the research team. This allowed the research team to analyse the factors influencing the targeted behaviours and adapt the CEE model to meet the needs of the local context. The site champions provided the research team with essential insider knowledge including providing insights into some of the challenges experienced by staff and the general morale amongst the hospital team. They also made suggestions for changes in the CEE model based on information they had heard ‘along the grapevine’ from other team members. They continued to champion the project when morale and motivation waned, such as when the site experienced reductions in the nurse-to-patient ratio. They also promoted the re-uptake of the CEE model after each admission of a patient with a stroke. This was an essential component of the success of this study as the hospital had reduced stroke admissions and therefore limited opportunities for the CEE model to be embedded in every day usual care practice.

As discussed in Chapter 9, staff reflected that a nurse champion would have been better positioned to promote nursing involvement and drive nursing implementation of the CEE model. This may have also promoted nursing participation in the qualitative component of this research. Additionally, this may have also facilitated training of a higher number of nurses and captured rotational or new nursing staff. A small observational study found that nurses were the most common communication partner for patients, after their family members (Godecke et al., 2014). However, nurses in a stroke rehabilitation unit report that time constraints often limit their capacity to comfort, talk with and provide education to patients (Ball et al., 2014). This lack of time for communication and education has also been identified by patients who “did not like to bother the busy nurse” (McCabe, 2004, p. 44).

However, improved nurse-patient communication as a result of nurse training saved time, reduced the frustration, and reduced the burden associated with caring for PWA (McGilton et al., 2009). Similar benefits were also perceived by nurses in the current study who reported the CEE model saved time, improved efficiency and provided them with a “better handover”. Therefore, increased nursing involvement in the study including the development of a nurse site champion role will be an important consideration in future studies investigating, implementing and evaluating a CEE model. It could also be argued that a medical site champion may also be indicated, as there was limited medical participation in this study. This may be a challenging goal to achieve given the regular rotations of junior medical staff and the time constraints often experienced by senior medical staff. However, senior medical championing of the project and ongoing training of rotational medical staff may be an important consideration in future studies. This may be particularly pertinent given that improved staff-patient communication may result in more accurate patient diagnoses, care, treatment, better patient outcomes and improved professional patient relationships (Legg et al., 2005; McCabe, 2004; McGilton et al., 2009; Hersh et al., 2016; Street et al., 2009).

11.3 Potential Benefits of a CEE model

There may be a wide range of benefits of a CEE model. This adapted EE model considered the complexities of aphasia and the additional support that may be required for PWA to engage in language activities. Triangulation of the quantitative and qualitative results from this study suggest the CEE model has the potential to positively influence engagement in meaningful language activities for patients during early stroke recovery in hospital. Staff perceived the CEE model provided opportunities for PWA to engage in language tasks. This was also reported by patients who perceived benefit in engaging in a variety of meaningful language activities.

The CEE model provided opportunities to promote several neuroplasticity processes that appear to be relevant for aphasia recovery. For example, the intervention was implemented in two hospital wards to target patients early after stroke to potentially utilise the increased expression of genes and proteins that promote neuroplasticity and aphasia recovery during this time period. Additionally, the principles of: specificity (rehabilitation

targeting the specific skilled task that therapy is aiming to rehabilitate); repetition (repetition of a learnt behaviour over a prolonged period of time required for neural re-mapping); and distributed practise (gaps between learning timepoints to facilitate retention of information and provide opportunities to practise learnt skills outside the learning session), were potentially promoted through a number of CEE model initiatives. This included: the joint Speech Pathology-multidisciplinary therapy sessions; the talking program; loaned electronic tablets; interactions with trained communication partners who had access to communication supporting resources (the communication tips board and the communication support pack); and increased social opportunities with staff and other patients in the afternoon tea.

In addition to potentially utilising neuroplasticity processes that occur early after stroke, a CEE model appeared to promote patient-centred care and improved health care communication access during early stroke recovery through communication partner trained health staff. Communication partner training provided health staff and volunteers with the skills required to support effective communication with PWA and patients with other communication impairments. Hospital staff perceived the CEE model improved the efficiency of their therapy sessions as a result of using communication supporting strategies and resources. This was perceived to facilitate communication exchange within treatment activities, allowing staff to provide more rehabilitation activities within their therapy sessions. A large proportion of staff and volunteers in this study reported increased awareness of resources that could aid communication with patients, perceptions of increased confidence in using trained strategies, and willingness to approach communication interactions with PWA. Staff also reported more accurate patient diagnoses, care and treatment and improved professional-patient relationships. Not only did the CEE model allow for greater efficiency within sessions, but it was also reported to enable more meaningful participation with PWA who might not have been previously approached, which was satisfying for staff.

Positive differences were observed in staff attitudes towards communication and aphasia following the implementation of the CEE model. The model appeared to sensitise staff and volunteers to the feelings of patients and support respectful engagement. Staff reports in the after phase demonstrated an attitude towards valuing holistic patient care, with the perception that factors beyond medical and physical limitations, such as social

opportunities and engagement with staff, were important in patients' stroke care. Staff also described a shared responsibility of communication amongst the multidisciplinary team rather than the sole responsibility of the ward speech pathologist. Staff described adapting trained resources and strategies with patients with other communication impairments, therefore a CEE model may not only be beneficial to stroke survivors with aphasia but has the potential to improve communication access for all patients following stroke in hospital during their early recovery.

As a fundamental feature of human interaction, enhanced language activity during stroke recovery has the potential to: augment neuroplasticity processes to promote aphasia language recovery; positively influence patients' experience of stroke recovery in hospital and their perceptions of stroke care; provide opportunities to engage in meaningful language opportunities and social activities; mitigate boredom; and promote communication access through communication trained staff and communication supporting resources. Improved access to meaningful language activities, social opportunities and communication trained staff may not only be beneficial to PWA but may also benefit PWOA as well as other patients with and without communication impairments in hospital.

11.4 Limitations and Future Directions

Implementation of a CEE model was feasible whereby 71% of the intervention was reported to be available to the intervention group. It is important to note that the availability of the CEE model was monitored by the hospital site champions, therefore these results do not reflect a true audit. The recent results of a Phase II feasibility study investigating an EE found individual driven enrichment activities were difficult for patients to access and were rarely within sight or reach (Janssen et al., 2021). Therefore, the availability and accessibility of the CEE model will be an important consideration and will need to be further explored and audited in future studies.

The unforeseen contextual issues that occurred in the current study potentially influenced the implementation and availability of the CEE model. However, these factors are likely to reflect the realities and challenges of the real-world hospital environment. Implementation of a CEE model did not significantly increase the amount of patients' engagement in language activities in the small sample that constituted the study. However,

the trend towards higher levels of language activities in the intervention group suggests a future trial is warranted to further investigate the feasibility, safety and effect of a CEE model for PWA and PWOA. The reduced availability of the CEE model for PWOA requires further attention to determine if the elements of the model could be better applied to this population.

This study involved a small number of patients, and a broader range of perspectives may have been expressed with a larger number of patient participants, particularly given patient experiences within the CEE model were highly individual. Patients receiving stroke rehabilitation within the participating sites were not involved in the development of the model therefore co-design of a CEE model with stroke survivors would be an important next step. We also suggest including a wider range of resources and activities in the CEE model that can be easily accessed to promote activities for patients who may be restricted to their bedside as a result of stroke related deficits and staff time constraints. Additionally, increased focus on promoting patient activities in the evenings and on weekends may be an important consideration. In this study, patients in the intervention group were asked specifically about elements of the CEE model they were exposed to, therefore this may have elicited increased reports of the variety of language activities they engaged in.

A small number of medical and nursing staff were involved in this study in comparison to allied health staff, which may be reflected in the reported results. This may be indicative of the challenges related to engaging nurses and medical staff in ward-based hospital interventions and should be addressed in future research. Inclusion of medical and nurse site champions may promote medical and nursing involvement in a CEE model and associated data collection. Additionally, future iterations of a CEE model should consider strategies that enable the provision of training to more staff over a longer period of time, such as site champions providing training beyond the study period. This would potentially address challenges associated with staff changes. Leadership support, site champions, teamwork, collaboration and education are factors identified in the literature to promote the uptake of interventions (Ploeg et al., 2007). Consideration of these strategies in future iterations of a CEE model may promote long-term sustainability and culture change. Staff feedback on the CEE model and aphasia communication partner training indicated they wanted more opportunities to practise the trained strategies in a range of role plays. They also requested more video examples, as well as real life communication scenarios,

demonstrating the use of the communication trained strategies and resources. This would be an important consideration in the future development of the CEE model and other aphasia communication partner training programs.

Family members are the most common communication partner for PWA in hospital (Godecke et al., 2014), however visitors did not participate in the CEE model and aphasia communication partner training program. Inclusion of visitors should be considered in a CEE model to promote visitors advocating and facilitating patient engagement in activities. Encouragement of visitors attending the wards may enhance communication opportunities for patients between therapy times by providing opportunities for socialisation in patients' rooms as well as facilitating and advocating for patient access to communal areas. This has the potential to mitigate the impact of social isolation from factors such as being in single rooms, staff time constraints and patient's stroke related physical limitations.

Our CEE model did not include promotion of music listening. Music has been found to activate a wide network of brain regions involved in language (Sarkamo et al., 2008; Callan et al., 2006; Johansson, 2006) such as semantics (Sarkamo et al., 2008; Koelsch et al., 2004), prosody, pitch and temporal processing (Johansson, 2006). A study found that listening to music was superior to audiobook listening in improving the recovery of verbal memory, focussed attention and mood; and reducing depression and confusion in patients following stroke (Sarkamo et al., 2008). Therefore, opportunities for patients to listen to music should be incorporated in a CEE model in the future.

The combination of an EE and task specific rehabilitation is thought to have a synergising effect which promotes neuroplasticity processes in stroke recovery (McDonald et al., 2018). Rodents who were exposed to an EE together with task specific rehabilitation demonstrated significant improvements in motor recovery compared to those exposed only to EE or intensive rehabilitation (McDonald et al., 2018). Although the mechanisms of language recovery early after stroke are hypothesised to require a different theoretical approach to motor recovery when considering therapy intensity (Godecke et al., 2020), it may be important to explore aphasia therapy dosage when investigating the influence of a CEE model on aphasia language outcomes.

Previous studies have found that communication partner training has the potential to reduce the risk of preventable adverse events (Bartlett et al., 2008; Legg et al., 2005; Street et al., 2009). Therefore, the effect of a CEE model on the occurrence of preventable

adverse events may be important to explore in future studies. Additionally, it is not yet understood if a CEE model translates to improved patient outcomes such as engagement in rehabilitation and functional language recovery, patient mood and health-related quality of life, which should also be considered in future research.

This study was conducted at a private hospital involving a mixed acute and a mixed rehabilitation ward, therefore the results reflect this context and may not be directly generalisable to hospitals in the public sector. Future larger trials further developing the CEE model and testing the feasibility and safety of this model across a range of hospital sites is the next step in determining the benefit of this adjunct to hospital-based rehabilitation. The active ingredients within a CEE model and how these might influence overall communication outcomes in stroke recovery remain unknown. Additionally, a CEE model will need to cater for the individual needs of patients, staff and hospital sites. Therefore, there is potential that a CEE model may be different for each patient, multidisciplinary team and hospital site. Additionally, the implementation approach may also need to be tailored to each site. This has the potential to create challenges in measuring outcomes of a CEE model and would need to be considered if a future multi-site study were undertaken.

11.5 Conclusion

This is the first study to develop and embed a CEE model in a hospital ward setting. Consideration of implementation science approaches in this pilot study informed the development of a CEE model to be an individual and service-level intervention that was implemented in clinical practice. Patient perceptions, in conjunction with staff and volunteer perceptions and direct observation of patient activities, suggest a CEE model has the potential to increase patient engagement in meaningful language activities in hospital during their early stroke recovery. Despite the factors that may have negatively influenced patient engagement with the model, the intervention group demonstrated a trend of engaging in a higher proportion of language activities than the control group. However, this difference was not significant in the small sample size that constituted this study.

The CEE model was perceived to benefit staff, volunteers, the hospital system, and patients through increased staff and volunteers' knowledge, skills and confidence in using communication supporting strategies which: improved communication exchange with

patients; enabled staff to provide more meaningful and efficient rehabilitation sessions and interactions during nursing care; improved staff-patient connections; and promoted patient engagement in rehabilitation. The CEE model was also perceived to provide increased opportunities for patients' language use and socialisation within therapy, care tasks and outside of therapy times, which potentially positively influenced their overall experience of stroke care during their early recovery.

The CEE model involved the combination of communication partner training in addition to the enhancement of the physical environment, availability of organised social activities, and the provision of language and communication promoting resources to provide additional support for PWA within an EE framework. A CEE model may not only be beneficial to PWA but may also improve communication access for all patients following stroke in hospital and may positively impact stroke outcomes. Use of this CEE model, in conjunction with evidence-based rehabilitation, has the potential to: enhance functional language recovery for PWA; reduce the research evidence to clinical practice gap in aphasia management; improve communication access; and improve patient experiences in hospital during early stroke recovery.

Chapter 12. References

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The REhabilitation and recovery of peopLE with Aphasia after Stroke (RELEASE)

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