

## Study protocol

# Time to get moving: Evaluation of an evidence-based, multicomponent tailored intervention to improve hospital mobility

## Background

Loss of independence in activities of daily living (functional decline) is the most common complication of hospitalisation in older adults, occurring in one third to one half of older acute patients<sup>1,2,3</sup>. Getting patients up and moving in hospital is fundamental to preventing functional decline and other common complications such as delirium and falls<sup>4</sup>. Increased mobility (including ambulation, exercises and/or maintaining self-care such as toileting and transfers) can also reduce hospital length of stay and admissions to sub-acute care and nursing homes<sup>5,6,7</sup>.

Despite evidence for the benefits of inpatient mobility, low levels of mobility persist. Indeed, international studies have reported that patients admitted to hospital spend less than 10% of the day either standing or walking<sup>8,9</sup>. Recent studies have confirmed a large range of patient, staff, ward and organisational barriers to mobility. Strategies that successfully improve inpatient mobility need to be multi-professional, multicomponent, target local barriers and should focus on those patients who are not functionally independent<sup>8,9,10,11</sup>.

Mobility remains low on medical and surgical wards in Metro North Health. Since 2019, the Eat Walk Engage™ program has worked with local teams on ten medical wards at RBWH, TPCCH, Redcliffe and Caboolture hospitals to identify and address patient and ward-based barriers. During this time, there have been improvements in mobility, as measured by activity mapping, with the average percentage of daytime hours spent standing, walking or wheeling, increasing from 7.1% to 8.2%. However, we hypothesise that we may have reached a ‘ceiling’ for ward-based improvement efforts, and further improvements will require a co-ordinated, hospital and organisation-wide approach. Addressing organisational barriers such as policies, training, documentation and infrastructure are often beyond the reach and influence of our ward-based Eat Walk Engage facilitators. Engaging a wider range of organisational stakeholders to assist multi-level change, may enhance further improvement in mobility levels.

This study represents the second phase of a multi-phase improvement project undertaken with the overall aim of improving inpatient mobility on MNHHS medical wards. Our project uses a structured implementation framework (EPIS: **explore, prepare, implement, sustain**).

The **explore** phase undertook structured organisational and bedside audits as well as a multidisciplinary staff barriers survey, and drew on an existing mobility documentation review and a qualitative evaluation of 200 patient interviews across Eat Walk Engage implementation wards. Together, these studies have clearly articulated the local barriers from patient, staff, team and organisational perspectives. We also conducted an umbrella review of evidence for system-level mobility interventions.

In the **prepare** phase we established a Multi-professional Mobility Improvement Collaborative (MMIC), consisting of key stakeholders from across MNHHS. This group consists of consumers, clinicians (Medical, Nursing and Allied Health), operational staff, managers and state-wide representatives. This advisory group met twice in November 2022 to review the data from the **explore** phase and they have now prioritised the following identified barriers:

- *no policy/guideline providing expectations about mobility at any hospital in MN HHS*
- *a risk averse culture whereby concerns about falls results in discouragement of mobility—despite evidence that greater mobility does not increase falls and indeed may be protective*
- *poor interdisciplinary communication of mobility status and goals across sites due to lack of a common terminology and fragmentation of documentation*
- *a physical environment which is cluttered and not supportive of mobility due to limited equipment storage capacity*
- *inconsistent staff perceptions about medical appropriateness to mobilise*

Our next steps are to **co-design solutions** to these challenges. The investigator team will put forward a range of potential solutions to the broader advisory group (the MMIC), based upon international literature and findings from our preliminary work. Together, a mobility strategy will be developed, implemented and evaluated across the Metro North Health medical wards. This mobility strategy will include multiple components to address local challenges at several levels and may include i) development of a mobility policy/ procedure, ii) modification of existing assessment tools to improve mobility communication between, iii) strategies to improve local storage to reduce environmental clutter. Additionally, we seek to assess its **sustainment** over a two year period. This protocol describes the evaluation plan for this quality improvement program.

## Research plan

Research questions guiding our study are:

- 1.) How well is the mobility strategy adopted across the participating wards?
- 2.) Does a tailored mobility strategy improve average daytime mobility in medical wards across Metro North Health?
- 3.) Does a tailored mobility strategy reduce functional decline, length of stay, discharge to an alternate destination and 30 day hospital readmissions?

## Methods

This study is a prospective, multisite pre-post hybrid study which will evaluate the implementation and effectiveness of a co-designed mobility improvement strategy.

The timeline for evaluation is shown in the figure below.

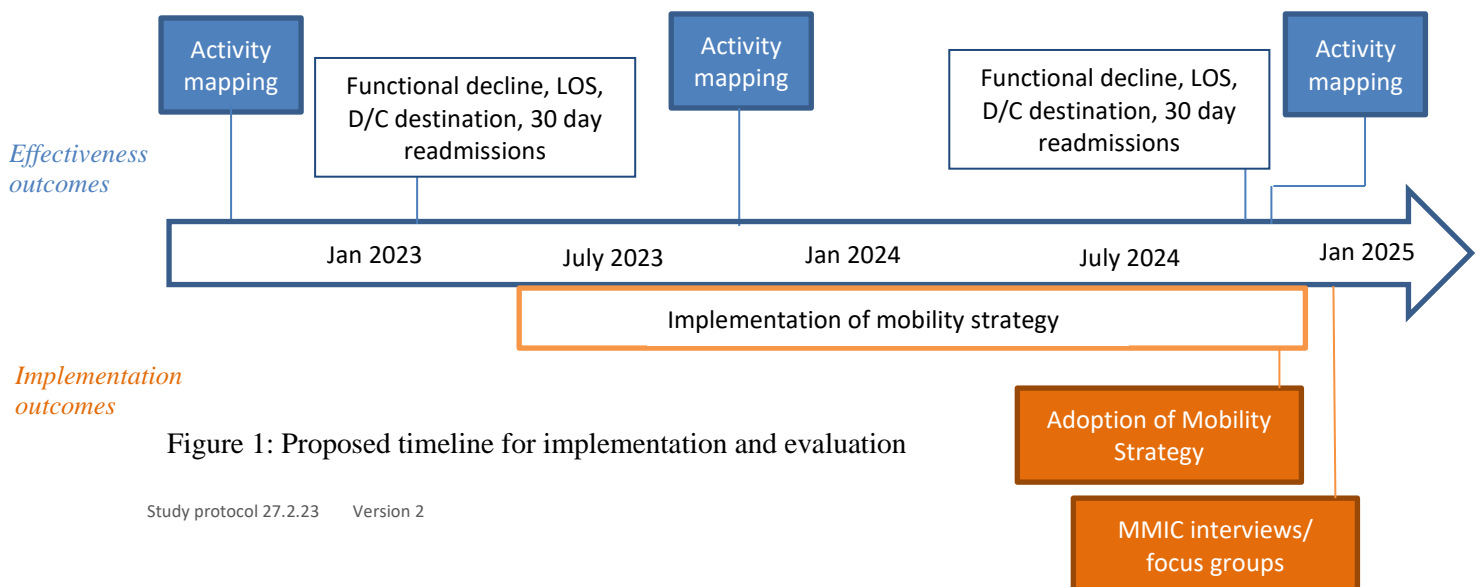


Figure 1: Proposed timeline for implementation and evaluation

**Setting and participants:**

The study will be conducted on 10 medical wards across MN Health : the Royal Brisbane and Women's Hospital, The Prince Charles Hospital, Redcliffe Hospital and Caboolture Hospital. All ten wards have participated in the state-wide Eat Walk Engage™ program and in the **explore** phase of this project conducted in 2022. Participants will be admitted inpatients on the study wards before, during and after implementing the co-designed MMS, and members of the Multidisciplinary Mobility Improvement Collaborative (MMIC). Participant inclusion and exclusion characteristics are provided in discussion of each of the measures.

**Intervention:**

The MMS will be co-designed with the MMIC and implemented across the participating wards. Example strategies may include: development of a policy to facilitate inpatient mobility, modifications to documentation and communication processes, interprofessional education and training. Small workgroups consisting of key stakeholders from the MMIC will be formed to progress specific elements of this work. The implementation phase will be overseen and supported by the project team and co-ordinated by the Project Officer. Successful uptake of the mobility strategy will be facilitated through broad multi-professional engagement which has been undertaken at all sites, use of key management stakeholders as champions, through existing Eat Walk Engage facilitators already embedded within clinical settings and through the established professional networks of our investigator group.

**Evaluation of intervention effectiveness**

The primary outcome (daytime mobility) will be measured before, during and after implementation (Figure 1) using a validated activity mapping protocol routinely measured each year on all participating Eat Walk Engage wards<sup>12, 13</sup>. Eligible participants are all ward inpatients (excluding those receiving end of life care) who are systematically observed at regular intervals over an 8 hour period (8am to 4pm) with the highest level of activity recorded (eg. lying, sitting in bed, sitting in a chair, standing, walking). No individual or health data are collected in these measures, which are routinely performed annually as a key performance measure within the Eat Walk Engage program. Data collection will be undertaken by the trained Eat Walk Engage facilitator on each participating ward, and all data cleaned and analysed by the Eat Walk Engage state-wide data manager, per usual practice. Daytime mobility will be reported as the average proportion of patient observations spent standing and/or walking for each ward. As a secondary analysis we will also examine the average proportion of patients observed to be standing and/or walking at any time during the day.

Secondary outcomes (functional decline, length of stay, falls, discharge destination and 30 day readmission from acute care) as well as descriptive characteristics and potential confounders will be measured in a prospective multi-site cohort study before and after implementation (Figure 1) Eligible participants will be patients aged 65 years and older admitted to the implementation wards for more than 48 hours (as these are the cohort at most risk of functional decline, and the target of our improvement intervention). We will exclude patients receiving end of life care or who are critically ill, or those who are unable to independently consent due to severe cognitive or psychological impairment or language difficulties that would interfere with their ability to participate in a short

interview. Eligible participants will be identified by the clinical teams, and the research assistant will seek informed consent from all participants.

During the consent process, the research assistant will explain the study in detail including the following:

- i) *participation at three different time points (baseline, discharge, 1 month following discharge)*
- ii) *time commitments for each assessment*
- iii) *examples of information to be collected*
- iv) *participation is entirely voluntary and will not affect medical care*
- v) *opportunity to withdraw from the study at any time*

The research assistant will then ask the patient to repeat this information back to them to determine their understanding and capacity to consent. Patients who are deemed unable to individually consent on the basis of their cognition, will be excluded from the study.

Functional status will be measured using the Katz Index of Independence in ADL<sup>14</sup>. This validated tool, which takes less than five minutes to perform, rates an individual's ability to perform the six functions of bathing, dressing, toileting, transferring, continence and feeding. Individuals are scored as being either independent (score = 1) or requiring supervision/assistance (score = 0), with a score of six indicating full function. Participant scores will be collected at four timepoints i) two weeks preceding admission (based on participant recall at admission), ii) admission (with information relative to current functional status), iii) hospital discharge and iv) 30 days post discharge. Admission and discharge assessment will be undertaken in person and 30 day follow-up by phone.

Hospital length of stay, discharge destination and number of readmissions within 30 days following discharge, will be collected from the medical record by the research assistant following hospital discharge.

Baseline descriptive characteristics and co-variates will be collected from the medical record (age, sex, Aboriginal and Torres Strait Islander status, admission date, admission team, co-morbidities, number of regular prescribed medications, admission in the previous 30 days) and from a brief structured patient interview by a trained clinical research assistant (frailty using the Clinical Frailty Scale Health Questionnaire; malnutrition risk using the two-item malnutrition screening tool; cognitive status using the Short Portable Mental Status Questionnaire; continence screening).

### **Analysis and sample size estimates:**

**Daytime mobility:** The proportion of observations at different levels of activity (lying, sitting, standing or walking) will be described for each ward at each time point in tables or graphs. The change in percentage of patients spending time upright and mobile before and after implementing the MMS will be evaluated using mixed effects modelling accounting for clustering by wards. We estimate that each activity mapping ward sample will provide around 500 observations (5000 observations for each time point), providing >80% power to demonstrate an increase in proportion of patients from 8% to 10%

Participant characteristics of the pre and post implementation cohorts will be summarised across all wards using appropriate descriptive statistics. Functional decline will be defined as any decrease in ADL score between two weeks before admission and hospital discharge; 'in-hospital decline' will be any decrease in ADL score between hospital admission and discharge, and '30 day decline' will be any decrease in ADL score between two weeks before admission and 30 day follow-up. The effect to

of the intervention on functional decline will be tested using general estimating equations adjusted for clustering, with time point (pre/post) as the main effect, and adjusted for clinically important co-variables. We estimate that a cohort sample size of 400 in each group will provide >80% power to test for a reduction in functional decline from 30% to 20%.

Length of stay, inpatient falls, discharge destination and 30 day readmission will be summarised across all wards before and after the implementation, and the effect of the intervention estimated using appropriate models, to build a comprehensive picture of intended and unintended consequences.

### **Evaluation of implementation**

Adoption of individual components of the mobility strategy will be measured across sites, repeating elements of the phase one quality audits appropriate to measurement of the anticipated changes in the targeted organisational barriers. This may include directed ward observations (e.g. uptake of agreed bedside communication tool, re-audit of equipment and storage), staff survey, and/or key informant discussions (e.g. implementation of organisational policy).

Feasibility and acceptability will be assessed by interviews with key multi-level stakeholders identified through the MMIC (either direct membership or through snowballing techniques). Interviews and/or focus groups will be recorded with individual consent, transcribed and analysed using mixed deductive and inductive analysis (based on previous literature) to identify key barriers and enablers to change, unintended consequences, and perceptions of impact and sustainability of the strategy.

Additional costs of implementation will be estimated from program documents and key informant discussions.

### **Feasibility, capability and risk mitigation**

The research team includes members who are experts in physical activity, applied gerontology and implementation science. PI Adsett has been awarded a Metro North Clinician Researcher Fellowship 2023-2026 to support this work. CIs Mudge and McRae developed and lead the successful Eat Walk Engage program which has been proven to significantly reduce delirium in hospital and been implemented across 20 hospitals in Queensland. The current study will directly inform and enhance the Eat Walk Engage program, and the strong established network of clinicians and leaders committed to improving care of older inpatients will provide a mechanism for rapid translation of successful findings.

The team has a strong collaborative track record of successfully undertaking and completing multi-site research both locally and across Queensland, including observational, mixed methods and intervention studies in mobility and exercise interventions in inpatient and post hospital settings. Previous multisite studies recruiting patients with similar inclusion and exclusion criteria have recruited 3-8 participants per ward per week, so it should be feasible to recruit 40 participants should be recruited within 8-10 weeks on each ward.

Having invested adequate time for genuine multidisciplinary engagement, this project has been designed to identify and mitigate potential risks. Potential risks include delays associated with COVID-19 and inconsistent uptake and acceptance of the mobility strategy across four different health facilities. COVID-19 interruptions will be minimised by flexible scheduling, using an existing health service staff member as the research assistant, and changing stakeholder meetings to a virtual format

as required. This has proven successful for our studies conducted in 2022. Poor uptake across facilities will be minimised through broad multi-professional engagement which has been undertaken at all sites, use of key management stakeholders as champions and through the established professional networks of our investigator group.

## Data Management

The project team will follow the research guidelines and policies for data storage, access and privacy. All data pertaining to the study will be stored electronically in the secure Metro North REDCap database, with password access only available to the study team. Any hard copies of data will be stored centrally in a locked cabinet located within the offices of the Internal Medicine Research Unit at RBWH and shredded after entry into REDCap. The data will be de-identified at source and only de-identified data will be loaded into the online data management system. In accordance with NHMRC data management guidelines, data will be stored for at least 5 years after publication. Beyond this time period, data will be permanently deleted unless required for extended studies.

## Dissemination of results

Results of this study will be disseminated through multidisciplinary professional presentations; through research presentations at local hospital symposia and national and international professional conferences; through consumer and community presentations in collaboration with our consumer representatives; and through peer-reviewed publications. Findings will inform continuous improvement of local policy and practice.

## References

1. Hirsch CH, Sommers L, Olsen et al. The natural history of functional morbidity in hospitalized older patients. *J Am Geriatr Soc.* 1988; 38:1296-1303.
2. Lloyd C, Markland AD, Zhang Y, et al. Prevalence of hospital-associated disability in older adults: a meta-analysis. *J Am Med Dir Assoc.* 2020;21(4):455-461 e455.
3. Mudge AM, McRae P, Banks M et al. Effect of a ward-based program on hospital associated complications and length of stay for older inpatients. The cluster randomized CHERISH trial. *JAMA Intern Med.* 2022; 182 (3): 274-282.
4. Brown C, Friedkin R, Inouye S. Prevalence and outcomes of low mobility in hospitalized older patients. *J Am Geriatr Soc.* 2004;52(8):1263-1270.
5. Covinsky KE, Palmer RM, Fortinsky RH, et al. Loss of independence in activities of daily living in older adults hospitalized with medical illnesses: increased vulnerability with age. *J Am Geriatr Soc.* 2003;51(4):451-458.
6. Hoyer EH, Friedman M, Lavezza A, et al. Promoting mobility and reducing length of stay in hospitalized general medicine patients: A quality-improvement project. *J Hosp Med.* 2016;11(5):341-7.
7. Hoyer EH, Needham DM, Atanelov L, et al. Association of impaired functional status at hospital discharge and subsequent rehospitalization. *J Hosp Med.* 2014; 9(5):277-282.



8. De Foubert M, Cummins H, McCullagh et al. Systematic review of interventions targeting fundamental care to reduce hospital-associated decline in older patients. 2021. *J Adv Nurs*;77:4661-4678.
9. Taylor N, Harding KE, Dennett AM, et al. Behaviour change interventions to increase physical activity in hospitalised patients: a systematic review, meta-analysis and meta regression. 2022. *Age Ageing*. 51:1-10.
10. Seeger JPH, Koenders N, Staal JB. Effects of general physical activity promoting interventions on functional outcomes in patients hospitalised over 48 hours: A systematic review and meta-analysis of randomized controlled trials. *Int J Environ Res Public Health*. 2021. 18. 1233.
11. De Morton NA, Keating JL. The effect of exercise outcomes for older acute medical inpatients compared with control or alternative treatments: a systematic review of randomized controlled trials. 2007. *Clin Rehabil*. 21:3-16.
12. Kuys S, Dolecka U, Guard A. Activity level of hospital medical inpatients: an observational study. *Arch Gerontol Geriatr* 2012;55:417-21.
13. Mudge AM, McRae P, McHugh K, et al. Poor mobility in hospitalized adults of all ages. *J Hosp Med* 2016;11(4):289-91.
14. Katz S, Ford AB, Moskowitz RW, et al. Studies of Illness in the Aged: The Index of ADL: A Standardized Measure of Biological and Psychosocial Function. *JAMA*. 1963;185(12):914–919.