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Allied Health IMPACT study: Investigating the impact of Models of Practice for Allied health Care in subacuTe settings. A protocol for a cohort study of cost effectiveness and outcomes for patients exposed to difference models of Allied Health care.

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Allied Health IMPACT study: **I**nvestigating the impact of **M**odels of **P**ractice for **A**llied health **C**are in subacu**T**e settings. A protocol for a cohort study of cost effectiveness and outcomes for patients exposed to difference models of Allied Health care.

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Abstract

Introduction

This protocol considers three models of Allied Health staffing across three public health subacute hospital settings. This quasi-experimental study aims to evaluate the impact of providing additional Allied Health services in subacute care, both in rehabilitation and geriatric evaluation management (GEM) settings, on patient, health service and societal outcomes.

Methods and analysis

This health services research will analyse outcomes of patients exposed to different Allied Health models of care at three health services. Each health service will have a control ward (routine care) and an intervention ward (additional Allied Health). This project consists of two parts. Part One: A whole of site data extraction for included wards. Outcome measures will include: length of stay, rate of readmissions, discharge destinations, community referrals, patient satisfaction and feedback and exploration of staff perspectives. Part Two: Functional Independence measure (FIM™) scores will be collected every two to three days for the duration of 60 patient admissions, in addition to routinely collected admission and discharge FIM™ scores.

Data from Part One will be analysed by a regression analysis conducted for continuous outcomes using patient-level data and binary outcomes. Qualitative data will be analysed using a deductive thematic approach. For Part Two, a linear mixed model analysis will be conducted using therapy service delivery and days since admission to subacute care as fixed factors in the model and individual participant as a random factor. Graphical analysis will be used to examine the growth curve of the model and transformations of the days since admission factor will be used to examine non-linear growth trajectories to determine if they lead to better model fit.

Ethics and dissemination The Monash Health Human Research Ethics committee gave approval for this multi-site research (LNR/17/MonH/144).

Strengths and limitations of this study

- Strength: The opportunity to investigate three different models of additional Allied Health across three health services concurrently
- Strength: A pragmatic evaluation of provision of additional Allied Health across three large metropolitan health services
- Limitation: This study is not a randomised controlled trial, so the trial design may lead to selection biases
- Limitation: Risk of bias due to inability to blind personnel in the intervention and control wards
- Limitation: Use of only a single measure- the Functional Independence Measure (FIM™)- as the primary outcome to map the functional improvement of patients

Introduction

Allied health service managers consider a range of factors when deciding how to allocate staff across different clinical streams of care (e.g. cardiopulmonary, oncology, geriatric rehabilitation) and service settings (eg. acute inpatients, subacute rehabilitation, outpatient services)[1]. One factor relates to the impact of the service, in terms of both patient outcomes and cost-effectiveness. However, Allied Health managers commonly rely on personal experience or benchmarking with other services to inform their decisions, as they perceive that relevant, reliable evidence is not commonly available to address their particular research question[1].

One area where there are high levels of involvement of Allied Health staff and a range of service delivery options available is inpatient, subacute care, which includes services for patients receiving rehabilitation and GEM. In Victoria, Australia inpatient rehabilitation is goal focussed care provided by an interdisciplinary or multidisciplinary team to patients of any age who may be experiencing injury or chronic illness or living with a physical disability [2]. Geriatric evaluation management (GEM) is care in which the treatment goal is functional improvement for a person whose medical needs are primarily associated with ageing [3]. Separate specialist rehabilitation services are also available for acquired brain injury or progressive neurological disorders [4]. In this study both GEM and rehabilitation subacute care will be considered.

Allied Health services in subacute hospital settings commonly include a core staff group of: Occupational Therapists, Physiotherapists, Social Workers, Dietitians, Speech Pathologists and Allied Health Assistants [3]. These Allied Health professionals assess patients' needs, goals, premorbid and current level of functioning and provide inpatient therapy accordingly. Their roles aim to improve patients' capacity to regain functioning, maximise independence and to support the patient and their family through the processes of discharge planning. Allied Health staff can also refer as

required to other Allied Health professionals outside this core team including: Psychologists and/or Neuropsychologists, Podiatrists, Oral Hygienists, Exercise Physiologists, music therapists and spiritual care practitioners.

To date, the theory supporting additional Allied Health service delivery models in subacute settings has relied on an assumption that, in providing a greater amount of Allied Health services, patients will experience faster rates of improvement in functional independence, accelerated healing, improved mobility and greater readiness for discharge [5]. Providing additional Allied Health resources may also facilitate earlier completion of the discharge planning process, resulting in reduced length of stay and cost to the health system. However, there are only a small number of trials that have directly examined the impact of additional Allied Health resources in subacute populations [5-7], and none that have modelled whether increasing the amount of Allied Health therapy services changes the trajectory of improvement in functional independence using more than two measurements of this outcome within a hospital admission.

Studies that have examined the impacts of providing additional services in subacute care have reported contrasting findings. A trial of Monday to Saturday rehabilitation showed outcomes including higher functional independence and health-related quality of life on discharge [5]. There was also indication that the additional service provided on Saturdays may have reduced length of stay [5]. Another study in Victoria, Australia, that evaluated the introduction of Saturday inpatient rehabilitation, reported no impact on length of stay, however improvement in functional outcomes were noted [6]. A study conducted in South Australian general medical acute wards reported increased Allied Health services (increased staffing and provision of weekend Allied Health services) contributed to reductions in length of stay [8]. Another study in a Victoria subacute hospital setting is investigating additional Allied Health models during the week and weekend targeting physical

activity interventions [9]. Results from this study indicated that increased physical activity for older people in a rehabilitation setting resulted in improved mobility for the intervention group, however there were no differences between intervention and control groups at discharge [7]. The interest in models of care and their impact on length of stay and optimizing functional improvement raise the need for further health services research.

This study aims to evaluate the impact of providing additional Allied Health services in subacute care, both in rehabilitation and geriatric evaluation management (GEM) settings, on patient, health service and societal outcomes. As part of the aim to evaluate patient outcomes we plan to determine the association between functional trajectories of patients exposed to different Allied Health models of care. A secondary aim of this study is to explore if service model differences change the amount of services actually delivered. There is limited understanding of models of care change and its impact on community based services including down-stream cost shifting. Therefore, it is important to understand if Allied Health models of care in subacute can improve economic efficiency of bed-based services. In addition, this study also looks to understand whether staff estimation of patient functional independence required to be able to be discharged is being met relative to date of discharge. Exploring these outcomes has benefits for health care as well as for broader society. It seeks to provide an insight into Allied Health service effectiveness and help inform decision making in regards to Allied Health staffing levels in subacute units.

Methods and analysis

Study design

This study will compare additional Allied Health care models to standard Allied Health care models at each of the three Victorian public health services included in this study (Figure 1). This protocol presents three separate trials on the same program of research. There are two parts to the study.

Part One of this study is an observational, pre-post intervention study with parallel control groups. Part Two is an observational, repeated measures, dose-response study nested within the larger observational study. Both parts of the study will be conducted across three health services, Peninsula Health, Monash Health and Eastern Health, Victoria, Australia. These three Victorian public health services recently introduced additional Allied Health staffing models in some of their rehabilitation and GEM wards.

Settings and Interventions

Each health service has applied a different model of care that will be trialled over a 6 month period.

Site 1: Peninsula Health

Peninsula Health provides health services to the metropolitan and regional areas on Victoria's Mornington Peninsula, with a population of over 300,000 people [10]. At Peninsula Health, an additional 5 EFT Allied Health personnel (two Physiotherapists, two Occupational Therapists and one Allied Health Assistant) will be introduced to manage selected patients across three subacute wards at The Mornington Centre. This team has a primary focus on providing Allied Health services to patients who meet the program criteria. This criterion is based on funding models that identify patients who potentially will benefit the greatest from intensive therapy. Patients accepted into the program are predominantly GEM, however rehabilitation patients are also eligible. The primary aim is to facilitate early discharge and greater intensity of Allied Health intervention.

Site 2: Monash Health

Monash Health is the largest public health service in Melbourne and provides clinical services to almost a quarter of the population in metropolitan Melbourne [11]. At Monash Health, there will be an increase of 20 to 30% in Allied Health staffing added to the existing staffing complement within one subacute ward. This increase will include additional Physiotherapy, Occupational Therapy and Social

Work. The participants for this study will be those admitted to the subacute ward and classified as GEM patients.

Site 3: Eastern Health

Eastern Health is a metropolitan and outer metropolitan service providing clinical services to over 750,000 people in the eastern community [12]. At Eastern Health, an additional Saturday service will be trialled on one subacute GEM ward for a period of six months. The additional service will consist of two additional Occupational Therapists, two Physiotherapists, two Social Workers and two Allied Health Assistants working a 7.6 hour shift on a Saturday equivalent to the same per-day staffing level as the Monday to Friday service. There will also be an on-call service for the Allied Health professions including speech pathology, psychology and dietetics for the period of the study.

Control- standard Models of Allied Health staffing at all sites

Each of the three health services will have a control subacute ward with similar patient cohort. At Peninsula Health both GEM and rehabilitation patients from an equivalent subacute ward will be included, at Monash Health patients with a GEM classification from an equivalent subacute ward will be included and at Eastern Health patients from an equivalent GEM ward will be included. These wards provide usual care with the standard Allied Health models of care as per current working protocols. The control patient data may be collected at a parallel time, or a sequential and equivalent time frame.

Part One

Outcomes

Complex interventions require a number of outcome measures rather than a single primary outcome [13]. In this study, a number of domains to measure the impact will be examined. Primary outcome

measures will be obtained through a whole of site data extraction for the period of the additional Allied Health trial. This will be for a six month period at each site.

Primary outcome 1: Length of stay relative to expected length of stay: The total days each participant stays on each ward. Length of stay information will be obtained through data extraction at each site for the duration of the intervention. Length of stay information is consistently used to gauge hospital service efficiency and is accessible from all health services.

Primary outcome 2:

Rate of unplanned hospital readmissions within 30 days of discharge: This information is routinely recorded by health services and will assist in understanding effectiveness of treatment and discharge planning.

Primary outcome 3:

Functional independence at discharge (adjusted for baseline value): Routinely recorded FIM™ scores at admission and discharge across will be extracted. These scores measure patients' level of functional independence and capture change in functioning from admission to discharge.

Secondary outcome 1:

Patient discharge destination: This will: be recorded as home, Transition Care Program (TCP), residential care or transfer to an acute or other inpatient ward. This information will establish whether patients were discharged to a new destination on discharge.

Secondary outcome 2:

Referrals to community services: The number of referrals from inpatient subacute to community services will be tallied. Referrals will be extracted from patient medical records. This outcome will provide an insight into downstream effects of the Allied Health models and any potential impact on the volume of referrals to community services.

Secondary outcome 3:

Patient satisfaction and feedback: Compliments and complaints arising from the wards will be included in this study. Consideration of the number and nature of the compliments and complaints.

Secondary outcome 4:

Cost of subacute treatment per patient: Measured costs for each patient's subacute hospitalisation using each hospital's clinical costing data.

Process measures include:

Allied Health occasions of service (patient level data): Data on the number of Allied Health occasions of service for patients on wards included in this study will be collected. This is to establish the amount of therapy patients receive.

Qualitative outcomes

Staff perspectives and feedback will be sought at the conclusion of the study. This will be conducted through an online staff survey and focus groups held at each intervention site. Focus groups will be audio recorded and the data transcribed verbatim.

Data analysis

For Part One a linear regression analysis will be conducted for continuous outcomes using patient-level data. For binary outcomes (eg. unplanned hospital readmission) a logistic regression analysis will be used. The examination of functional independence at discharge will include statistical adjustment for admission scores. The cost data will also be adjusted for expected length of stay.

The qualitative data collected through focus groups will be analysed using a deductive thematic analysis approach with constant comparison [14]. A process of coding will be undertaken by the principal investigators. The data at each of the three sites will be analysed separately. The results from the online survey will be analysed using descriptive statistics and deductive thematic analysis to explore themes arising from short answer questions [14]. Qualitative data analysis will be managed using NVivo 11 software.

Part Two

This component of this study aims to determine how long it takes patients to reach the minimum requirements for functional independence to be discharged (as judged by their treating team) prior to their actual discharge for patients receiving standard and additional Allied Health services.

Part Two participants and setting

Data for this component of the study will be collected from the intervention and control wards of each participating service. 30 patients (10 from each of the 3 sites) from the wards receiving additional Allied Health services and 30 patients (10 from each of the 3 sites) from the usual care wards will be included. All sequentially admitted patients to the control, and interventions ward will have their FIM™ scores collected from the treating team every two to three days. If the patient is discharged with less than three FIM™ scores recorded, their scores will be excluded from the study. A

minimum of three or more FIM™ scores (including routine admission and discharge FIM™s) are required to map functional improvement over time. Staff will also set FIM™ scores that will be the minimum functional independence target that the team assess the patient would need to achieve in order to be discharged.

Part Two outcome measures

The outcome measure will be the change, and the rate of change, of the FIM™ [15]. The FIM™ is an instrument that measures changes in a patient's functional ability during their admission. The FIM™ is routinely recorded in subacute settings at admission and discharge. Patients are scored on 13 motor items and 5 cognitive items, rating these items on a 7 point scale (1 = total assistance to 7 = complete independence.) The FIM™ is currently mandated by the Department of Health and Human Services, Victoria, Australia for all GEM admissions [3].

Collected length of stay data is detailed in the Part One study outcome measures.

Procedure

Each health service will have 10 participants recruited from an intervention ward (receiving an additional Allied Health model) and 10 participants recruited from a control ward (receiving a standard Allied Health model). These participants will be the first 10 consecutive admissions on intervention and control wards. In addition to FIM™ scores recorded on admission and discharge, additional FIM™ scores will be collected every 2-3 days during a patient's admission to track the trajectory of their improvement until discharge. Target goals for discharge will also be collected from the treatment team. These target goal scores will be collected at patient admission and re-recorded if there is a significant change in the patient's presentation during their admission potentially impacting on the goal for discharge. FIM™ scores will be decided by the treating team of Allied

Health, Nursing and Medical staff and will be collected by a member of the research team. This person will telephone in or attend ward meetings to document the scores for target patients. As these are observational, no enrolment of participants will be undertaken. There will be no recording of scores within the patient file to avoid recall bias.

Part Two data analysis

A linear mixed model analysis will be conducted using therapy service delivery and days since admission to subacute care as fixed factors in the model and individual participant as a random factor. Graphical analysis will be used to examine the growth curve of the model and transformations of the days since admission factor will be used to examine non-linear growth trajectories to determine if the lead to better model fit.

Adverse events

It is not anticipated that this research design is likely to result in adverse events provided there are no changes to routine practice.

Ethics and dissemination:

The Monash Health Human Research Ethics committee gave approval for this multi-site research (LNR/17/MonH/144). Peninsula Health and Eastern Health have provided local governance approval. The results will be disseminated through published manuscripts and conference presentations. Additionally, the reported outcomes may be placed on the Victorian Department of Health and Human Services website. This protocol presents three separate trials on the same program of research. Whilst individual studies may be published separately, this present study seeks to evaluate a program of initiatives.

Authors' contributions:

Authors FC, CW, KC, AW, FA, NT, NS, TH contributed to the design of the Allied Health models of care under investigation. FC, CW, TH and NT designed the research protocol. FC drafted the initial manuscript and CW, KC, AW, FA, NT, NS, TH provided critical review and final approval of the manuscript.

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Competing interests statement:

None declared.

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Figure 1 Study design

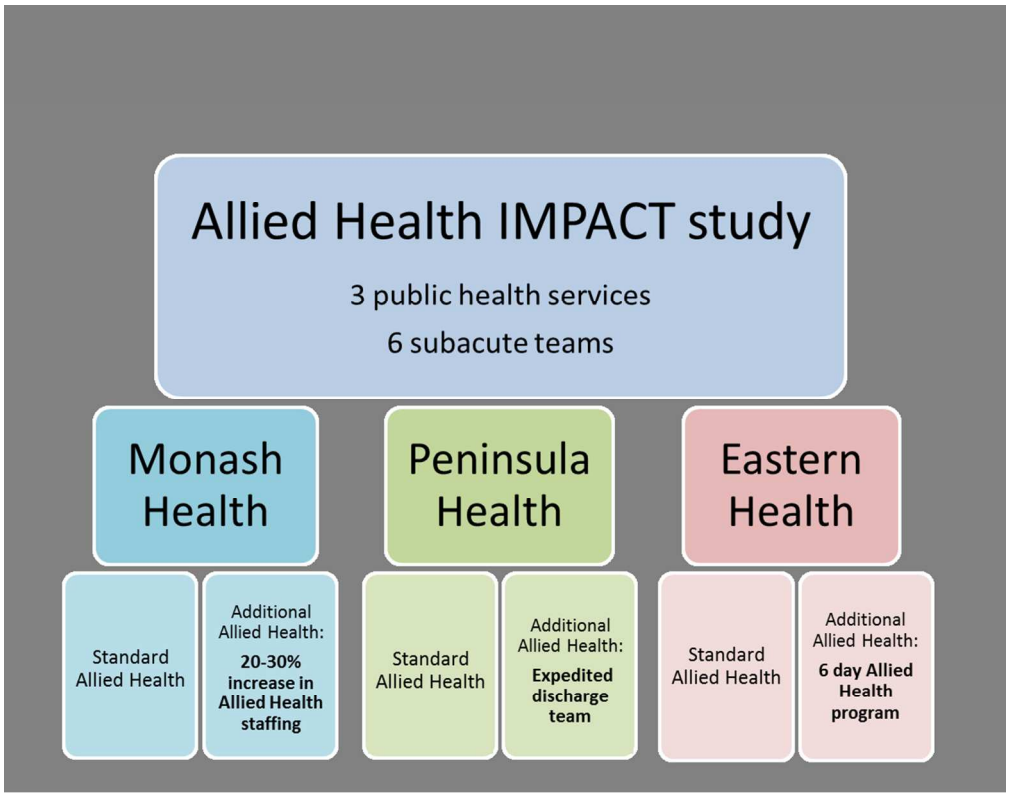

Figure 1

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Abstract

Introduction

This protocol considers three Allied Health staffing models across public health subacute hospitals. This quasi-experimental mixed methods study, including qualitative process evaluation, aims to evaluate the impact of additional Allied Health services in subacute care, in rehabilitation and geriatric evaluation management (GEM) settings, on patient, health service and societal outcomes.

Methods and analysis

This health services research will analyse outcomes of patients exposed to different Allied Health models of care at three health services. Each health service will have a control ward (routine care) and an intervention ward (additional Allied Health). This project has two parts. Part One: A whole of site data extraction for included wards. Outcome measures will include: length of stay, rate of readmissions, discharge destinations, community referrals, patient feedback and staff perspectives. Part Two: Functional Independence measure (FIM™) scores will be collected every two- three days for the duration of 60 patient admissions.

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Ethics and dissemination: Findings will be disseminated through local reports and to the Department of Health and Human Services Victoria. Results will be presented at conferences and submitted to peer-reviewed journals. The Monash Health Human Research Ethics committee approved this multi-site research (HREC/17/MonH/144 and HREC/17/MonH/547).

Strengths and limitations of this study

- Strength: The opportunity to investigate three different models of additional Allied Health across three health services concurrently
- Limitation: This study is not a randomised controlled trial, so the trial design may lead to selection biases
- Limitation: Risk of bias due to inability to blind personnel in the intervention and control wards
- Limitation: Use of only a single measure- the Functional Independence Measure (FIM™)- as the primary outcome to map the functional improvement of patients

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One area where there are high levels of involvement of Allied Health staff and a range of service delivery options available is inpatient, subacute care, which includes services for patients receiving rehabilitation and Geriatric Evaluation and Management (GEM). In Victoria Australia, inpatient rehabilitation is goal-focussed care provided within a team environment to patients of any age who may be experiencing injury or chronic illness or living with a physical disability.[2] GEM is care in which the treatment goal is functional improvement for a person whose medical needs are primarily associated with ageing.[3] Separate specialist rehabilitation services are also available for acquired brain injury or progressive neurological disorders.[4] Traditionally, these services are provided over five days (Monday to Friday). In this study both GEM and rehabilitation subacute care will be considered.

Allied Health services in subacute hospital settings commonly include a core staff group of: Occupational Therapists, Physiotherapists, Social Workers, Dietitians, Speech Pathologists and Allied Health Assistants.[3] These Allied Health professionals assess patients' needs, goals, premorbid and current level of functioning and provide inpatient therapy accordingly. Their roles aim to improve patients' capacity to regain functioning, maximise independence and to support the patient and

their family through the processes of discharge planning. Allied Health staff can also refer as required to other Allied Health professionals outside this core team including: Psychologists and/or Neuropsychologists, Podiatrists, Oral Hygienists, Exercise Physiologists, Music Therapists and Spiritual Care practitioners. Additional Allied Health service delivery models in subacute settings are often based on the idea that providing a greater amount of Allied Health services, patients will experience faster rates of improvement. Providing additional Allied Health resources may also facilitate earlier completion of the discharge planning process, resulting in reduced length of stay and cost to the health system. However, there are only a small number of trials that have directly examined the impact of additional Allied Health resources in subacute populations[5-7], and none that have modelled whether increasing the amount of Allied Health therapy services changes the trajectory of improvement in functional independence using more than two measurements of this outcome within a hospital admission.

Studies that have examined the impacts of providing additional services in subacute care have reported contrasting findings. A trial of Monday to Saturday rehabilitation showed outcomes including higher functional independence and health-related quality of life on discharge.[5] There was also indication that providing six days of allied health service may have reduced length of stay.[5] Another study in Victoria, Australia, that evaluated the introduction of Saturday inpatient rehabilitation (that is an additional day of service), reported no impact on length of stay, however improvement in functional outcomes were noted[6] A study conducted in South Australian general medical acute wards reported increased Allied Health services (increased staffing and provision of weekend Allied Health services) contributed to reductions in length of stay.[8] The uncertainty in models of care and their impact on length of stay and optimizing functional improvement raise the need for further health services research. Previous studies have indicated contrasting findings.

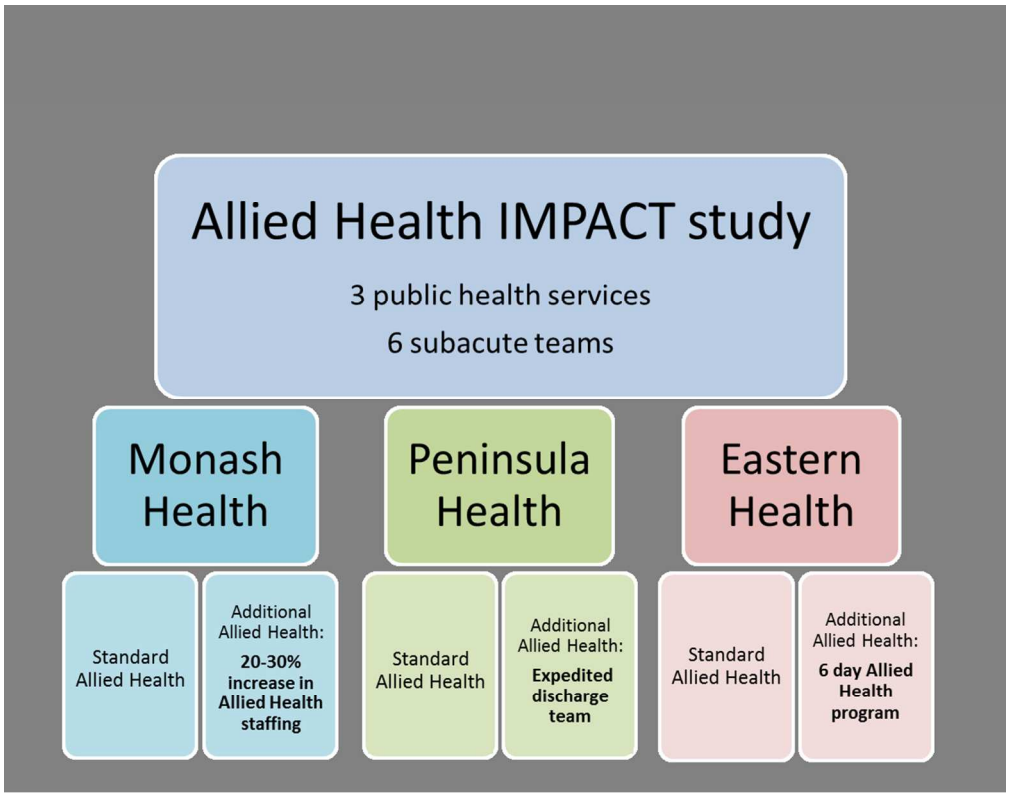

Figure 1

Standards for Reporting Qualitative Research (SRQR)

Title and abstract
S1 Title Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography,group) is recommended

- Pages 1, 2

S2 Abstract Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions Introduction

- Page 2

S3 Problem formulation Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement

- Pages 4-6

S4 Purpose or research question Purpose of the study and specific objectives or questions

- Page 6

Methods
S5 Qualitative approach and research paradigm Qualitative approach (e.g., ethnography, grounded theory, case study,
phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationaleb

- Page 2

S6 Researcher characteristics and reflexivity Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability

- Pages 13- 15

S7 Context Setting/site and salient contextual factors; rationale

- Pages 7-9

S8 Sampling strategy How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationaleb

- Pages 7-9

S9 Ethical issues pertaining to human subjects Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues

- Page 3

S10 Data collection methods Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative

process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale

- Page 9-11

S11 Data collection instruments and technologies Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study

- Page 9-11, 13

S12 Units of study Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)

- Pages 7-9, 13

S13 Data processing Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/deidentification of excerpts

- Page 11

S14 Data analysis Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale b

- Page 11

S15 Techniques to enhance trustworthiness Techniques to enhance trustworthiness and credibility of data analysis
(e.g., member checking, audit trail, triangulation); rationaleb
Results/findings

- Page 11

S16 Synthesis and interpretation Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory

- Protocol paper, no findings at this stage

S17 Links to empirical data Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings

- Protocol paper, no findings at this stage

Discussion
S18 Integration with prior work, implications, transferability, and contribution(s) to the field Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/ generalizability; identification of unique contribution(s) to scholarship in a discipline or field

- Page 4-6

S19 Limitations Trustworthiness and limitations of findings
(*Table continues*)

- Page 3

S20 Conflicts of interest Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed

- Pages 14,15

S21 Funding Sources of funding and other support; role

- Pages 14, 15