

Outliers:
A solution to a bed crisis
or putting patients at risk?
An integrative literature review.

Due date: 14th December 2018

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Abstract

Background

Worldwide health care providers are facing an epidemic of ageing patients, contributing to an increased demand for hospital beds to treat those with increasingly complex and chronic conditions. This results in an increased demand for services. Wards are often divided by speciality with highly trained staff who are knowledgeable of the conditions they are treating, trained to detect minute changes and initiate treatment before deterioration. If emergency departments are full or crowded and need to admit patients to wards, which are also full, patients may be directly admitted or other patients moved, and be treated on a ward where they were not intended to be placed, with staff who may be unfamiliar with their condition. These patients are known as outliers. Outliers are treated under the intended medical team, however, in a different area of the hospital often with staff unfamiliar with their care requirements. In contrast inliers are patients placed on the intended ward with intended health care teams to provide treatment.

Objectives/research question

The purpose of this integrative literature review was to explore the literature in relation to the practice of outlying and to assess if outlying a patient from their intended home ward and specialists influenced patient outcomes and resulted in detrimental patient outcomes. Therefore, this led to the development of the research question: what is the impact on the health outcomes of inpatients who are treated as outliers throughout their hospital stay, compared with those treated on their intended admission space as inliers?

Methods

An integrative literature review was selected as the most appropriate research approach to address the research question. The benefit of selecting this process is the organised pattern to thoroughly assess the available evidence resulting in an analytic summary of any findings, across numerous types of research studies. This contrasts with a systematic literature review which was not appropriate due to the variation of research methodologies.

Joanna Briggs Institute (JBI) tools were used to critically assess research for inclusion, before progressing onto data extraction and synthesis for thematic analysis using Braun and Clarke's (2006) approach. This process led to the development of three themes relating to the process of outlying which has been presented in a narrative format.

Findings

A total of 12 studies were included in the review and three themes arose from the thematic analysis. These were: potential failure of care, specialisation and the impact on outliers, and risk to patients and health care providers.

Conclusion

Recommendations included; ensuring the patient is fit to outlie, completing medical reviews of outliers prior to inlier patients, ensuring proper communication channels and documentation to be confirmed prior to outlying to ensure the outlying team can communicate with the admitting specialists, and be contacted if advice on management or review is needed throughout the outlying period. The development of pre-agreed wards to accept outliers is also recommended as this could increase the knowledge and confidence of staff when treating outliers not commonly seen in their department. Due to current future ageing predictions and the research gap in relation to outlying, future research is essential to consider the impact outlying will have on this elderly population with potential for multiple comorbidities complicating treatment.

Acknowledgements

I would first like to thank my supervisor's Dr Henrietta Trip and Dr Chris Moir of the Centre for Post Graduate Nursing at Otago University. For providing guidance on this journey, giving me space when it was needed, and throwing all their support behind me when I was ready. The door was always open for a visit, or available for a call despite the geographical distance.

I could not have gotten this far without the unwavering support of my family and friends, for all the encouragement over the years, through all the papers, exams and writing this dissertation. It would not have been possible to achieve this without them all. Thank you.

I did not take this journey alone, Steph we took the plunge so long ago into Post Graduate training because we wanted to challenge practice. I would not have progressed this journey without that push; we could not stop because what did we have to lose? Thanks for that push, all the study sessions, the proofreading, and just never letting me give up.

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Chapter One: Background

1.1 Introduction

Hospitals are often in a state of flux with a high volume of patients admitted, treated, and discharged, requiring a delicate balance of resources to meet population demands. This constant change can be a challenge to achieving balance between demand and supply, which, if incorrectly predicted, may lead to stretched hospital resources (Wong, Morra, Caesar, Carter, & Abrams, 2010). One of the most critical hospital resources is beds for patients. Several factors impact on the availability of hospital beds for patient treatment, such as the increased complexity of an ageing population and decreased availability of community services. These factors impact on where patients will be treated and by whom. In this integrative literature review, the impact of outcomes on patients whom are treated as outliers is explored. Throughout their hospital stay outlier patients experienced treatment on an unintended ward location without the related specialty health care team presence and are instead visited off ward by the intended medical specialists.

The student researcher is a registered nurse employed on a surgical ward where the practice of outlying is a regular occurrence; this observation led to the development of this topic. Frequently in this area complex medical patients are sent to the surgical ward for care and treatment, due to not enough beds on the medical ward. As a result, patients are treated on a ward with staff unfamiliar with procedures involved in medical patient care.

This chapter presents what influences the need for patients to be treated off-ward, and what has been done already to attempt to stem the practice of outlying. The review explores outcomes identified which could have an impact on those who are outlied and discuss whether this is an appropriate solution to the bed shortage crisis.

1.2 Worldwide population and ageing concern

Globally there is growing concern regarding current population trends, particularly the rise in the world's ageing population (United Nations, 2017). This ageing phenomenon is seen in nearly every country as those aged 60 years or above are now the fastest

growing group and is beginning to outpace younger generational growth (United Nations, 2017). This growth in the ageing population is predicted to be one of the most considerable challenges of social transformation of the 21st century and will bring consequences for all sectors, one specific being increased provision of health care services (United Nations, 2017). The period between 2015 and 2050 will see the world's population of those over 60 years of age, nearly double, rising from 12% to 22% (World Health Organization, 2015). There is currently estimated to be 962 million people aged 60 years or over and this is increasing at an estimated rate of 3% per year. These rates of increase are expected to rise in the future to as many as 2.1 billion people aged over 60 by 2050 (United Nations Department of Economic and Social Affairs Population Division, 2017).

A driver of population ageing can be linked to three factors: fertility, mortality and migration (United Nations, 2017). Of the three, fertility and mortality are key to impacting population factors. According to data presented by the United Nations Department of Economic and Social Affairs Population Division (2017), fertility rates are currently being shown to decline, while life expectancy rates are rising; in some areas of the world, significant rises have occurred. Between 2000-2005 and 2010-2015 there has been a rise in global life expectancy from birth by 3.6 years, therefore moving global life expectancy from 67.2 to 70.8 years of age. This projection is expected to increase, and by 2045-2050 life expectancy globally at birth could rise from 71 to 77 years of age (United Nations Department of Economic and Social Affairs Population Division, 2017). Oceania's life expectancy is expected to increase by four to five years, while some regions such as Africa may see a rise of nearly 11 years if programmes combating HIV and AIDs continue to be successful (United Nations Department of Economic and Social Affairs Population Division, 2017).

Increases in the ageing population and decreased fertility are causing a phenomenon never before witnessed in culture or history known as "the crossing". The crossing refers to the opposite growth trajectories of the younger children aged less than five, and the older adult population "converging, crossing and then diverging" from 1950 to 2050 (He, Goodkind, & Kowal, 2016, p. 13). This crossing is expected to occur around 2020 as the population of adults aged 60 and above will surpass the population of children under five, and is even predicted to double (He et al., 2016).

With an increasingly ageing population, there has been a rise in the number of non-communicable diseases causing death, which has increased in total by 42% between 1990 and 2013 (He et al., 2016). These include ischaemic heart disease, ischaemic and haemorrhagic stroke, atrial fibrillation and flutter, and peripheral vascular disease (He et al., 2016). In 2013 alone, cardiovascular deaths were responsible for almost a third of deaths globally. One complication associated with an ageing population and rising rates of non-communicable disease is that countries and health care providers need to be ready to manage, diagnose, treat and provide the end of life care including palliation (Naghavi et al., 2015). The number of non-communicable diseases often increases with age, resulting in multiple chronic conditions. When this occurs, it is multimorbidity. Multimorbidity often requires complex care due to the significant impact on the individual's health, and particularly the quality of life (He et al., 2016). Therefore, an ageing population presents the complex issue of managing the rising rates of chronic conditions and complex diseases while maintaining a high quality of life. This then flows onto the healthcare provider with increases in presentations and interactions with health services, which can create an overall increase in health care costs (Blay, Duffield, & Gallagher, 2012).

1.3 Emergency department presentations

Health care providers need to be prepared for an increase in patient presentations and managing those with increasingly complex conditions. The older population is more likely to have multiple comorbidities and complex long-term conditions, resulting in them being more likely to have urgent or chronic health concerns which require rapid assessment and care, and are likely to present to an emergency department for assessment (National Audit Office, 2013). There are already increased rates in those aged 55 years or over seeking health care at emergency departments. In Australia, it has been demonstrated that emergency department presentations increased by 6.1% between 2004-2005 and the 2008-2009 period (Blay et al., 2012). It is not only an increasing older population presenting to emergency departments being witnessed but an overall increase in presentations. In the United Kingdom the National Health Service have witnessed an overall 2.1% growth in emergency department admissions between 2015-16 and 2016-17, with an overall growth of 9.3% from 2013. However, the most

significant growth of emergency admissions came from those aged 65 years or over (National Audit Office, 2018).

In the period from 2010-2011 to 2014-2015, New Zealand Emergency Departments saw increases in the number of people treated, as national patient numbers rose from 640,000 to 690,000. The rate of presentations has increased from 14.4 to 14.9 per 100 of the population. The very young (less than five years) and elderly (greater than 85 years) have the highest rates; and often require expert assessment and treatment skills and can have complex management procedures (Ministry of Health, 2016).

Due to an increase in emergency department presentations in New Zealand, this is causing heightened strain on departments to provide treatment (Ministry of Health, 2016). From the 2010-2011 period to 2014-2015 there has been a 7.8% increase in presentations over that time period (Ministry of Health, 2016). This can be considered congruent with New Zealand's rising rate of population. From March 2010 New Zealand had an estimated population of 4,345,700, increasing to 4,647,300 by December 2015. This equates to a 6.9% rise over five years (Statistics New Zealand, n.d.). The combination of increased population and increased presentations to hospital has a flow-on effect. The increased cost of providing healthcare to more patients leads to stretched resources, financial constraints, and can potentially result in staff shortages. (Blay et al., 2012).

1.4 Changing medical practices impacting presentations

A further factor influencing the number of emergency department presentations relates to current changing medical practices and procedures. There is a substantial shift in the view of carrying out procedures as an inpatient where a person is admitted into hospital for a number of nights, to treatment as a day case, in which treatment and discharge from hospital occurs the same day. This potentially benefits the patient who can recover in their own environment (National Audit Office, 2013). However, a proportion of patients now treated as day cases will experience complications which require emergency department presentation and readmission. In the United Kingdom the National Health Service has reported there has been an increase from three million to 7.4-million-day case procedures between 1997-98, and 2012-13. Moreover, 9.4% of

readmissions could be explained due to a complication of care following a day case procedure (National Audit Office, 2013).

1.5 Hospital readmissions through the emergency department

A readmission refers to a person discharged within the last 30 days who presents through the emergency department (National Audit Office, 2013). In the United Kingdom, hospital readmissions rose by 69% between 1997-98 and 2012-13, to one million. In 2012-13 alone 19% of emergency admissions were readmissions. Many factors may influence this increase such as poor hospital care, and/or inappropriate early discharges which potentially compromise care (National Audit Office, 2013). Additionally, a person with multiple chronic conditions is at a higher risk of requiring readmission. This can be due to the increased complexity of their condition, and the requirement of ensuring adequate processes are in place to ensure ongoing management with their primary care provider. However, these are not always in place at the time of discharge (Basu, Avila, & Ricciardi, 2016). Within New Zealand, in a similar time period (2010-11) there were 7.6-11.5% unplanned acute medical readmissions within 28 days of discharge across the District Health Boards (DHB's) (Robinson & Kerse, 2012).

1.6 Hospital bed availability

Countries who are part of the Organisations for Economic Co-operation and Development (OECD) have witnessed the overall number of hospital beds decrease, from an average of 5.6 per 1000 of the population in 2000, to 4.7 in 2015. This can be attributed, in part, to advances in medical technology and improved processes, but also cost and financial constraints (OECD, 2017). Australian bed numbers have gone from 3.3 beds per 1000 in 1996 for a population of 18.3 million, to only 2.6 beds per 1000 in 2011 for an increased population of 21.5 million. This data shows a significant increase in the population however, a decrease in the availability of treatment beds (Bakes, 2014). Although, recent data from Australia in 2015 shows bed numbers at 3.8 per 1000 of population, potentially showing an increase and stabilisation. New Zealand bed population data experienced a similar period of decline between 2012 (2.83 beds) to 2015 (2.71 beds), before also appearing to enter a period of stabilisation until the end of

available data with 2.71 beds per 1000 of population remaining in 2017 (OECD, 2019). In contrast the United Kingdom National Health Service statistics show an overall decrease of general and acute beds by 5.8% due to closures (National Audit Office, 2018). Bed numbers have decreased from 4.08 per 1000 of population in 2000, to 2.58 per 1000 of population in 2017 (OECD, 2019).

Despite some stabilisations in bed numbers a further factor which impacts bed availability is the population change that will occupy the hospital beds. Across New Zealand, Australia and the United Kingdom population numbers have continued to grow between 2005 and 2016, from 559,310 increase of population in New Zealand, to as much as 5,209,506 growth of population in the United Kingdom (OECD, 2018). This population growth may result in an increased number of people trying to access a limited amount of hospital beds. Decreased availability of hospital beds adds stress to departments when trying to get a ward bed for a patient. In New Zealand the challenging process of gaining a ward bed is intensified when one in three emergency department presentations may need admission to a ward; the admission process, therefore, can become complicated when trying to gain a suitable bed for an admission on the correct department (Ministry of Health, 2016).

The development of new strategies and treatment protocols, some which can be managed via the community (instead of hospital emergency departments), may be one way to offset admissions through emergency departments, given the demand for decreasingly available acute care beds (Ministry of Health, 2018a). This occurred in both Sweden and Finland where reducing bed numbers coincided with the transfer of care to community providers for the care of patients (Mckee, 2004).

Within New Zealand, strategies are in place to provide more community-based services to decrease the strain occurring within hospitals. This is facilitated by coordination across services with an engaged workforce. The goal is to provide planned delivery of acute care within the community, rather than unplanned in hospitals (Ministry of Health, 2018a). Two strategies have been implemented in New Zealand, one includes Midcentral District Health Boards implementation of primary options for acute care (POAC). Clinical pathways and specified services were developed for patients with acute illnesses, identifying those who can be safely managed and treated by a

community General Practice Team (GPT), instead of transferring to emergency departments with funded appointments provided by the practice team (Mid Central District Health Board, 2018).

New Zealand has some of the highest admission rates for Chronic Obstructive Pulmonary Disease (COPD) per head of population in the OECD (Epton et al., 2018). A second example to facilitate increased community care is occurring within the Canterbury District Health Board with the implementation of a new service model for treatment of patients with COPD. In conjunction with hospital providers, general practitioners and ambulance services, a new triage tool was developed to divert appropriate COPD patients to community care to prevent unnecessary admission to hospital. Implementation of this protocol has led to a reduction in the number of patients with COPD being admitted to hospital, with bed day occupancy decreasing from 8200 bed-days per year in 2012, to 4320 in 2016 (Epton et al., 2018). This resulted in increased availability of beds for other patients who need them, especially as overall bed availability decreases.

1.7 Hospital bed occupancy

It is not only the number of hospital beds available which impacts upon the ability to treat current and new patients, but also the occupancy rates of those beds. Overall hospital bed occupancy has risen, which restricts the ability of hospitals to manage patient fluctuations - especially admissions from emergency departments. Hospitals with average occupancy levels above 85% are projected to experience complications with bed deficiencies, and experience periods of bed crisis when trying to manage current patients and find beds for new admissions (National Audit Office, 2013). Across England, acute hospital bed occupancy rates between 2000-01 and 2012-13, showed an occupancy rate increasing from 85% to 88%. Increased hospital occupancy worsened during the winter season with increases up to 95% at some hospitals. Increased occupancy rates presents a high concern for hospital planning and management as they become times of increased stress and workload expectations (National Audit Office, 2013).

The impact of increased hospital occupancy has further reaching effects which impact the ability of hospitals to run smoothly and can be detrimental to patient outcomes due to capacity strain within the system (Eriksson, Stoner, Eden, Newgard, & Guise, 2017). In a study completed by Eriksson et al. (2017), they discussed that capacity strain can be difficult to precisely investigate due to the numerous definitions available. However, data which is available currently supports that lower levels of bed occupancy is associated with decreased risk to patient mortality (Boden et al., 2016). This data is also supported by Madsen, Ladelund, and Linneberg (2014), who reported high occupancy rates were associated with increased risk to mortality, especially if the patient was admitted to the hospital out of hours over nights or during the weekend (Madsen et al., 2014). Further evidence to support proper processes to manage bed occupancy levels was identified in a study completed by Boden et al. (2016). They found that bad management changes to reduce medical bed occupancy also improved the hospital's ability to adhere to the emergency department four hour treating time target. Meeting this target also reduced further patient risks due to spending excessive time waiting for a ward bed.

A consequence of higher inpatient volumes and demand for inpatient beds is a reduced ability to manage fluctuating incoming patient numbers within available resources. Therefore, there is decreased capacity to manage within the hospital system (Soremekun et al., 2011). One potential consequence of high occupancy is the potential for patients to be admitted to any available bed (National Audit Office, 2013).

1.8 Delayed discharges impacting available beds

Delayed discharges from wards can result in a backlog of patients waiting to go home which creates increased pressure on hospital beds. The lack of available beds impacts on acute patients waiting for a suitable bed for admission and care (Green, Dorling, Minton, & Pickett, 2017). The population at the highest risk of occupying a bed longer than necessary is the elderly. When a discharge is delayed, patients are put at increased risk due to exposure to infection and inherent risks within the hospital environment (Landeiro, Roberts, Gray, & Leal, 2017). A discharge delay may occur in instances where a patient is medically clear but is not yet fit for discharge from an inter-disciplinary team point of view, or because of the availability of community-based

services to ensure ongoing support at home. This is compounded by social services in many hospitals not covering seven days a week (National Audit Office, 2013). One proposal as a solution to manage hospital crowding and allow smooth patient flow, is through improved bed management processes and managing hospital capacity through early discharges. Improved bed management processes aids to prevent access blockages and allowing beds for incoming patients (Khanna, Boyle, Good, & Lind, 2012). Delayed discharge risks to patients, particularly the older adult, may include: hospital-acquired infection, urinary tract infection, drug reaction, fractures, phlebitis, diarrhoea, confusion, acute renal failure and depression (Landeiro et al., 2017). The longer time spent in hospital, increases the risk of overall decline, further morbidity and disability, and potentially then requiring a bed for even longer (Landeiro et al., 2017).

1.9 Emergency department overcrowding

Increased presentations to emergency departments, full wards, people awaiting discharge, and decreased bed numbers can result in access block which is a common concern when attempting to admit patients to hospitals. Access block can be defined as a situation which arises when patients are not able to get access to the most appropriate clinical bed in a reasonable length of time (Shetty et al., 2017). Furthermore, the combination of increased occupancy within hospitals, and access block has a negative flow on effect on patient outcomes, worsening length of stay, increasing readmission rates and re-presentations to emergency departments (Sprivulis, Da Silva, Jacobs, Frazer, & Jelinek, 2006). Access block and high hospital occupancy may in turn result in overcrowding of emergency departments which can be defined as:

...the situation in which emergency department function is impeded primarily because of the excessive number of patients waiting to be seen, undergoing assessment and treatment, or waiting for departure, comparing to the physical or staffing capacity of the emergency department (Yarmohammadian, Rezaei, Haghshenas, & Tavakoli, 2017, p. 1).

One of the primary causes of overcrowding is a lack of available hospital beds, resulting in patients spending longer waiting in the emergency departments creating congestion, crowding and prolonged emergency department stays (Richardson & Mountain, 2009).

Overcrowding has become a well-recognised issue within healthcare and has been documented in many countries including Australia, Canada, USA, The Netherlands, Finland, Denmark, the UK and Singapore (Elder, Johnston, & Crilly, 2015). Sprivulis et al. (2006), presented evidence on the risk of overcrowding within emergency departments to the patient with overcrowding being associated with a 30% relative increase in patient mortality by day two and seven, for patients requiring admission through the emergency department to a ward bed. Noting overcrowding to be a significant patient safety issue.

Braitberg (2007) also discussed the impact of overcrowding, with evidence of a 43% increase in deaths within a study of those treated in an overcrowded emergency department, in contrast to those treated in a non-overcrowded department. If the patient requires admission, time spent waiting in overcrowded emergency departments can be an interruption to the patient journey and may delay procedures and interventions that would occur on the ward. Overcrowding therefore, can possibly impact upon patient morbidity, mortality, and subsequently result in an increased length of stay (Wong, Kozan, Sinnott, Spencer, & Eley, 2014). Research has identified the impact overcrowding has on the administration of antibiotics and analgesics with a notable delay. In worst case scenarios emergency department overcrowding has been shown to delay the onset of resuscitation efforts in critically unwell patients. (Hong, Shin, Song, Cha, & Cho, 2012). Finally, patients may be held in corridors while waiting for a bed which can result in compromised standards of care and loss of dignity (Ministry of Health, 2016).

1.10 Emergency department treatment and assessment times

Emergency departments are further pressured by the times set for assessment, treatment and either discharge home of patients or admission to a ward. In 2004 the United Kingdom Department of Health introduced a four-hour waiting standard to emergency departments, for the assessment treatment and admission or discharge of patients. Initially requiring 98% before relaxing to 95% of patients to be seen under this time frame with incentives for meeting the required percentage. The aim was to allow for focusing appropriate resources to the patients and enhanced decision making; this resulted in the development of new strategies for working and managing staff allocation

with overall benefit to the patient by reducing waiting times (National Audit Office, 2013). However, this goal adds additional stress for emergency departments to gain a bed on the ward for patients which, at times, means wherever one can be found (Crawford et al., 2014).

In New Zealand, shorter stays in emergency departments have also been a National Health Target since 2009. The shorter stay target (six hours) was developed after increasing numbers of presentations to emergency departments resulted in departments struggling to manage the influx of patients, in conjunction with delays in admission to hospital, treatment and discharge home. This was a target identified by the New Zealand Government as needing to be addressed, so they introduced the health target “shorter stays in emergency departments” to all District Health Boards (Ministry of Health, 2011, p. 2). The goal of the target is that “95% of patients will be admitted, discharged or transferred from an emergency department within six hours” (Ministry of Health, 2011, p. 2). In contrast to the United Kingdom’s four-hour time frame, the six-hour time frame was selected as an acceptable amount of time to assess, treat and, if required, admit a patient. Such time which was deemed reasonable for adequate care, but not an unacceptable time for a patient to wait (Ministry of Health, 2011). Since beginning in the United Kingdom, this policy to address emergency department waiting times has spread to countries including New Zealand, Australia and Canada. However, each country has varying times set as the treatment parameters. The primary emphasis of the target is to encourage health providers to be incentivised to come up with strategies and solutions to meet the hourly target, therefore also alleviating some of the pressures placed upon emergency departments, improve treatment times and patient outcomes (Tenbensen et al., 2017). However, these targets can add strain to an already stretched system when attempting to get a suitable bed for an admission. A lack of beds due to decreased capacity and overcrowding in the emergency department causes a backflow of patients, resulting in the inefficiency to provide a high level of care promptly for all patients. Bed shortages may result in a detrimental impact on patients including increased length of stay, increasing the risk of error and avoidable complications (Scott, Vaughan, & Bell, 2009).

1.11 Boarding

When unable to get a ward bed, emergency department patients may be boarded. This has become a well-researched phenomenon (Sri-On et al., 2014). Boarding means that patients are boarded or held in the department once the decision has been made to admit, but there is no available inpatient bed. The result is that patients spend extended time waiting in the incorrect department (Singer, Thode, Viccellio, & Pines, 2011). Knowing who has responsibility for the patient when admitted, makes identifying accountability for care complicated, potentially impacting on patient care and outcomes (Lord et al., 2018).

The emergency department is an unpredictable environment for patients with considerable variation in presenting concern and acuity, and whose clinicians' primary focus is on stabilisation and initial diagnosis, not ongoing treatment and management (Liu et al., 2011). Due to the variation in the care requirement, when a patient has been accepted for entry into a ward, and no bed is available, this raises concern as to whether boarded patients will get the same level of care and observation due to competing needs by more acute presentations (Singer et al., 2011). Emergency department boarding has been associated with numerous safety concerns and impacts on patient safety including increased hospital length of stay, and mortality (Liu et al., 2011; Sri-On et al., 2014), higher rates of myocardial infarct (Liu et al., 2011), higher rates of ventilator-associated pneumonia and higher rates of medication errors and preventable adverse events (Singer et al., 2011). Because boarding in emergency departments has been documented to have adverse impacts on patients, strategies to assist patient movement, to aid meeting national targets and ensure the smooth flow of patients from the emergency department to ward beds, have been developed to target the practice of boarding and delayed discharge from the department (Tenbensen et al., 2017).

1.12 Strategies to manage emergency department overcrowding and assessment times

Some researchers have divided strategies into three groups to manage emergency department demand; input, throughput and output solutions (Tenbensen et al., 2017). Input relates to managing patients who may present before they are admitted by

assessing and treating them in the community and thus making primary care more accessible (Tenbenschel et al., 2017). Patients may be screened as they arrive and if low acuity, may be directed back to the community for care, and ambulances diverted to other hospitals (Healy-Rodriguez et al., 2014). In the United Kingdom, the National Health Service has developed strategies and programmes to reduce the strain on emergency departments and reduce presentations and required admissions. This has been achieved by integrating health and social care, improving the availability of primary care providers, and improving the efficiency and working environment within emergency departments (National Audit Office, 2018).

Depending on location there can be a variable number of services available to patients in contrast to presenting to emergency departments. These may include general practitioner surgeries, urgent care centres, walk-in clinics, and equitable access centres. Which offer variable services and levels of assessment. One theory as to why people present to emergency departments versus community providers is due to the different services provided (National Audit Office, 2013). Patients may be unsure where to present, resulting in their bypassing community providers and going to emergency departments instead (National Audit Office, 2013). Additionally, cost can be a prohibitive factor which influences people's decision to present to emergency departments instead of general practitioners or after-hours services, which can have a high fee in contrast to the free service available at emergency departments. There is also discussion that since the implementation of shorter stays in emergency departments and increased efficiency of processing times, this has resulted in people being more likely to attend an emergency department rather than community services (Thornton, Fogarty, Jones, Ragaban, & Simpson, 2014).

A further complication in accessing community services are the operational hours. Although secondary services within hospitals operate 24 hours a day across seven days a week, primary and social services do not complement this (National Audit Office, 2013). When patients require assessment and treatment at any time, they may be restricted to access services after hours, which often incurs a higher cost than a general appointment during operational hours, which may be a barrier for some people (Ministry of Health, 2018b). emergency department. If a patient requires social services to facilitate safe discharge and it is after hours or the weekend, a patient may

sit in a hospital bed awaiting normal hours and resumption of social services. The result of no services being available may be that a patient remains in hospital despite being medically well ultimately holding a bed which could have been used for a potential admission (National Audit Office, 2013).

Throughput strategies include efficient management of emergency department staff, resources and space, thereby ensuring adequate resources are available to treat incoming patients (Tenbenschel et al., 2017). Nurse practitioner numbers in Australia are projected to rise as much as 94% by 2025 (Elder et al., 2015). In New Zealand a nurse practitioner is a nurse who has undertaken additional education and clinical training to demonstrate a higher level of practice and competence, extending beyond the competencies and practices of a regular registered nurse (Nursing Council of New Zealand, 2018). Within the literature, there is discussion about the use of nurse practitioners to meet additional health needs and how they will be of benefit within the emergency department (Elder et al., 2015). A nurse practitioner in the emergency department has an increased scope of practice as an independent practitioner. They can play a vital role in improving patient throughput and can independently assess, diagnose, treat, prescribe and complete referrals within their scope, thus aiding the movement of patients through the department (Elder et al., 2015).

Medical assessment units are another throughput strategy to improve emergency department patient movement and come under many names including: acute assessment units (AAU), short stay units (SSU), observation wards (Tenbenschel et al., 2017), acute medical unit (AMU), and medical assessment unit (MAU) (Byrne & Silke, 2011). They provide short-term management options of patients who need acute assessment and treatment. This allows a pathway to fast-track patient care, easing the pressure on emergency departments by providing a quick avenue out of the department for the patient (Elder et al., 2015). These units are designed, staffed and equipped to manage medical patients from emergency departments and community providers with set policies on whom to accept, with a general accepted maximum length of stay often around 72 hours for stabilisation, treatment and discharge (Byrne & Silke, 2011).

Finally, output solutions are primarily concentrated on managing patient flow and effective discharging (Tenbenschel et al., 2017); this may include strategies to manage

emergency department presentations and bed management. One example is high capacity hospital surge plans including discharging where appropriate and cancelling surgeries. Attempts are made to increase communication between departments with bed management programmes facilitated through a bed-coordinator to attempt smooth patient flow (Healy-Rodriguez et al., 2014). However, these initiatives are not always successful.

1.13 Outliers

Due to increased patient presentations to emergency departments and pressure to admit or discharge within treatment time limits, patients may be moved from their intended admission space to a different unit, or a patient may be admitted directly to a different unit than intended. These patients can be termed as outliers: “a patient who is placed in a clinically inappropriate bed when there are no beds available on the specialty ward” (Bakes, 2014, p. 3). These patients are then treated in an environment without the intended admitting team or specialists present. They may be treated by staff who are unfamiliar with their condition, and therefore not as likely to recognise subtle changes, as those who primarily work in the patient’s area of care (Bakes, 2014). Staff skill set may impact care, for example; a cardiac patient may be sent as an outlier to a surgical ward where the nurse may not be familiar with the specialised care required for a cardiac patient. As a result, the nurse may not be as comfortable or confident following processes of care which will be different for the outlier patient, presenting with a condition not associated to that ward (Nunn et al., 2017). This is compared to an inlier patient who is treated on the intended ward under intended specialities with the intended interdisciplinary team.

1.14 Previous literature review of outliers

Before commencing the integrative review, a literature search was completed to assess that there was no previously published review on the practice of outlying. One review by Metcalfe, McNally, and Smith (2017) was found. Metcalfe et al. (2017) completed a systematic narrative review on the impact of inpatient location with emergency calls. They completed a review of only two articles due to the limited literature available. This study varied from the integrative review with variation in the clarification of the

intervention under investigation. Although Metcalfe et al. (2017) was interested in outliers and outcomes of in-hospital mortality and length of stay, they were investigating this population, and the intervention required for the outlier to experience a medical emergency team (MET) call. The outcome investigated was the impact the MET call, and the combination outlying had on the identified patient outcomes. In contrast, this integrative review was interested in the population of all inpatients and the overall intervention of outlying, and what impact outlying has on numerous patient outcomes, therefore not limiting to outliers solely experiencing MET calls. Patient outcomes also included a more exhaustive investigative list than the narrative review which focused on length of stay and hospital mortality.

1.15 Chapter summary

The increased pressure on hospital resources, including the trend of an ageing population with multiple comorbidities and/or complex conditions, has presented a challenge for how to manage emergency department admissions when there is associated department overcrowding and boarding. With high patient occupancy levels within hospital wards and limited availability of beds, these in turn influence and facilitate the practice of outlying. A process where patients are not placed on their intended ward destination and are instead outlied to a selected ward for treatment. This raises concern that patients treated as outliers may be at risk of poorer outcomes than patients placed on the appropriate wards with the correct care teams (Shetty et al., 2017).

In the following chapters the research question is identified, search strategy described, and the process taken to complete the integrative literature review outlined. The tools and processes of critical appraisal, data analysis and synthesis are explained. Braun and Clarke's (2006) thematic analysis is described as it informed the development of the three key themes. The findings of the review are detailed with reference to the characteristics of the included studies, which is followed by a discussion of the themes in relation to current healthcare context and literature. Finally, a review of how outlying can be safely accomplished with applications for future practice and research is presented.

Chapter Two: Methods

2.1 Introduction

In this chapter the steps taken to complete the integrative literature review are detailed, and the stages of the research process are explained. The rationale for using an integrative literature review method is outlined as the optimal research approach to answer the question. The search strategy demonstrates the process undertaken and, the tools selected for quality appraisal data extraction and analysis are presented. Finally, an outline of the initial research findings is provided.

2.2 Integrative literature review

The advantage of selecting an integrative literature review process to address the research question was in part due to the organised pattern expected to assess available evidence, therefore, resulting in an analytic summary of findings (Boswell & Cannon, 2017). An integrative literature review is a method to examine and summarise past research from numerous studies, and thereby draw conclusions to the research question (Russell, 2005). The strength of an integrative review is that a wide range of research questions are able to be answered, across numerous methodological studies, thereby combining various research approaches across experimental, non-experimental, quantitative and qualitative research (Whittemore & Knafl, 2005). A well developed and prepared review can provide an explicit representation of current literature findings (Russell, 2005).

Quantitative research is commonly concerned with assigning numerical figures to represent reality and aims to explore the relationships between cause and effect. It works to assess, measure, and analyse variables. This contrasts with the aim of qualitative research, where the goal is to understand a phenomenon and discover meaning, instead of simple cause and effect. Qualitative research uses language and communication to understand experiences instead of numerical association (Fain, 2015). There is still discussion today regarding the combination of quantitative and qualitative research methods, and what can be understood by combining data from different research approaches. However, despite the controversy, each method brings a

different perspective of research approaches to explore phenomena and answer research questions (Gelo, Braakmann, & Benetka, 2008).

The integrative literature review process has a number of strengths and benefits. As there is the need to manage large sources of data this can therefore, aid in the evaluation and synthesis of the current available evidence. When there is a lack of literature this enables the identification of gaps in current research and a recognition of where future research and development is needed. Through the integrative review new concepts and frameworks to explore the research question can be developed (Russell, 2005). The practice of outlying is growing within hospitals and is, therefore, a new and emerging trend without a comprehensive amount of literature underpinning the practice. Integrative literature reviews can also have impact on the development of nursing practice, policy and procedure, as findings can be used to inform and shape nursing using evidence-based practice (Whittemore & Knafl, 2005).

An integrative literature review is however limited by the amount of available literature and studies published at the time of review. If there is a lack of evidence, this may produce a weak review or complete inability to carry out a review. Researchers may need to alter their research question or inclusion criteria or widen the scope of the study to gain additional literature. Integrative literature review sample populations, for example, are limited to the samples obtained from the original research piece (Russell, 2005).

This is in contrast to a systematic literature review, which is a well-structured methodological inquiry into research data using a pre-planned method of data collection and analysis (Polit & Beck, 2012). There are two common forms of systematic literature review encompassing meta-analysis and meta-synthesis. Meta-analysis is a review method to understand and integrate quantitative research findings. It combines the findings of numerous quantitative studies and analyses them statistically, whereas a meta-synthesis integrates findings from qualitative studies (Polit & Beck, 2012). Neither option was appropriate due to the variation of research studies between qualitative and quantitative, thereby excluded the possibility of a meta-analysis or meta-synthesis. Therefore an integrative literature review method was selected to address the research question (Whittemore & Knafl, 2005).

2.3 Research question

This question was developed after the author witnessed the frequent practice of allocating patients to a ward environment which was not the intended admitting space. Due to a lack of available beds in the intended service, patients were outlied to a different ward area which did not specialise in the care requirements for selected patients. This was seen when medical patients were placed on surgical wards when the incoming patients would result in outnumbering the available beds in that unit. However, this was not restricted to medical-surgical patients, but adult patients also being placed on paediatric wards when the demands on the hospital outstripped supply.

Therefore, the research question was identified as:

What is the impact on the health outcomes of inpatients who are treated as outliers throughout their hospital stay, compared with those treated on their intended admission space as inliers?

2.4 Search strategy

To develop evidence-based practice and influence change, the research process ensures a clear set of steps is followed to assess the evidence, thus ensuring the validity of the study. Only then can it be assessed for influencing ongoing practice (Schardt, Adams, Owens, Keitz, & Fontelo, 2007). To facilitate a successful and meaningful project, the first step is to develop a clear research question, as this guides all further steps in the research process; one such method of defining the research question commonly used is the PICO framework (Aslam & Emmanuel, 2010). The PICO framework is valuable as it allows the researcher to articulate all aspects of the research question and informs the potential search terms. This is advantageous as it informs the development of the search strategy pathway for an explicit and systematic approach, therefore, maintaining rigour within a study (Cooke, Smith, & Booth, 2012). The PICO framework was developed in 1995 as a mnemonic to analyse essential parts of a research question, and aid in the identification of essential information and comprises specification of the: population, intervention, comparison and outcome (Davies, 2011).

2.4.1 Research question outline: PICO

Population of interest

The population of interest was adult inpatients (outliers) requiring care carried out in a hospital ward in any hospital public or private, in either an acute or elective medical/surgical setting. Not including independent psychiatric hospitals who did not provide medical surgical services. Psychiatric, paediatric and intensive care unit outliers were not considered within the review, only medical/surgical inpatients.

Intervention

The intervention was adult inpatients admitted either directly to or subsequently sent to, a secondary ward from their intended ward under the intended responsible medical specialists and interdisciplinary teams, for any length of time throughout their stay. For example, a medical patient being sent to a surgical ward due to the need for a bed for new acute medical admissions to the ward.

Comparison

Patients remaining on the intended ward (inliers) with intended specialists, nurses and other personnel relevant to their presenting concern. For example, a medical patient being sent to the medical ward and whether their outcomes showed variation to those who were outlied.

Outcome

The impact on patient outcomes and whether there is any variation in outcomes between inliers and outliers, ultimately if being an outlier has any impact of health outcomes. For example, outcomes may include but not be limited to length of stay, readmission rates, patients' perception of care, and communication between health professionals and the patient.

2.4.2 Search terms

The search terms used to identify the population included ‘inpatients’, ‘medical patient’, ‘surgical patient’, ‘intended ward’, ‘hospital unit’, ‘adult inpatient’.

To explore the intervention search terms included ‘outlier’, ‘border’, ‘boarding’, ‘hospital bed capacity’, ‘clinically inappropriate bed’, ‘outlying’, ‘hospital bed utilisation’, ‘crowding area’, ‘hospital bed management’.

Terms to identify potential patient outcomes included ‘deterioration’, ‘care’, ‘perception’, ‘length of stay’, ‘communication’, ‘hospital mortality’, ‘hospital readmission’, ‘mortality’, ‘morbidity’, ‘patient safety’, ‘personal experience’.

2.4.3 Databases

An initial literature search was completed which included searching the Cochrane Library, and the Joanna Briggs Institute (JBI) to establish that no review currently existed on the topic in question. The following databases were searched due to their relevance to the availability of health literature and included: Google Scholar, CINAHL, MEDLINE (Ovid), EMBASE and PsychInfo. MESH headings were utilised in the search process, in addition to using subject terms and full-text term searching. Boolean symbols, as well as AND/OR were utilised for the search of critical literature.

2.4.4 Limitations

Limits were put in place to ensure that only pertinent literature was sourced for inclusion in the review. Only English language literature was searched. Studies were restricted to the publication dates between 2008-2018, unless they were identified as strongly relevant or as a seminal article. All articles were from peer-reviewed journals and were checked against the inclusion criteria to ensure they covered the hospital adult inpatient population. These limitations were put in place due to the extensive age range and presenting conditions of adults needing hospital admission to capture as much data as possible. Paediatric and intensive care unit outliers were excluded due to the care provided for this patient class being more specialised.

At the completion of the search, all remaining literature titles and abstracts were reviewed for relevancy, and duplicates were removed when identified across different databases. Furthermore, article reference lists were examined for potential additional literature to include in the review. At the conclusion of the search process, 18 articles were identified and were read in full text to ensure relevance to the topic before they were analysed using the critical assessment tools (Figure one).

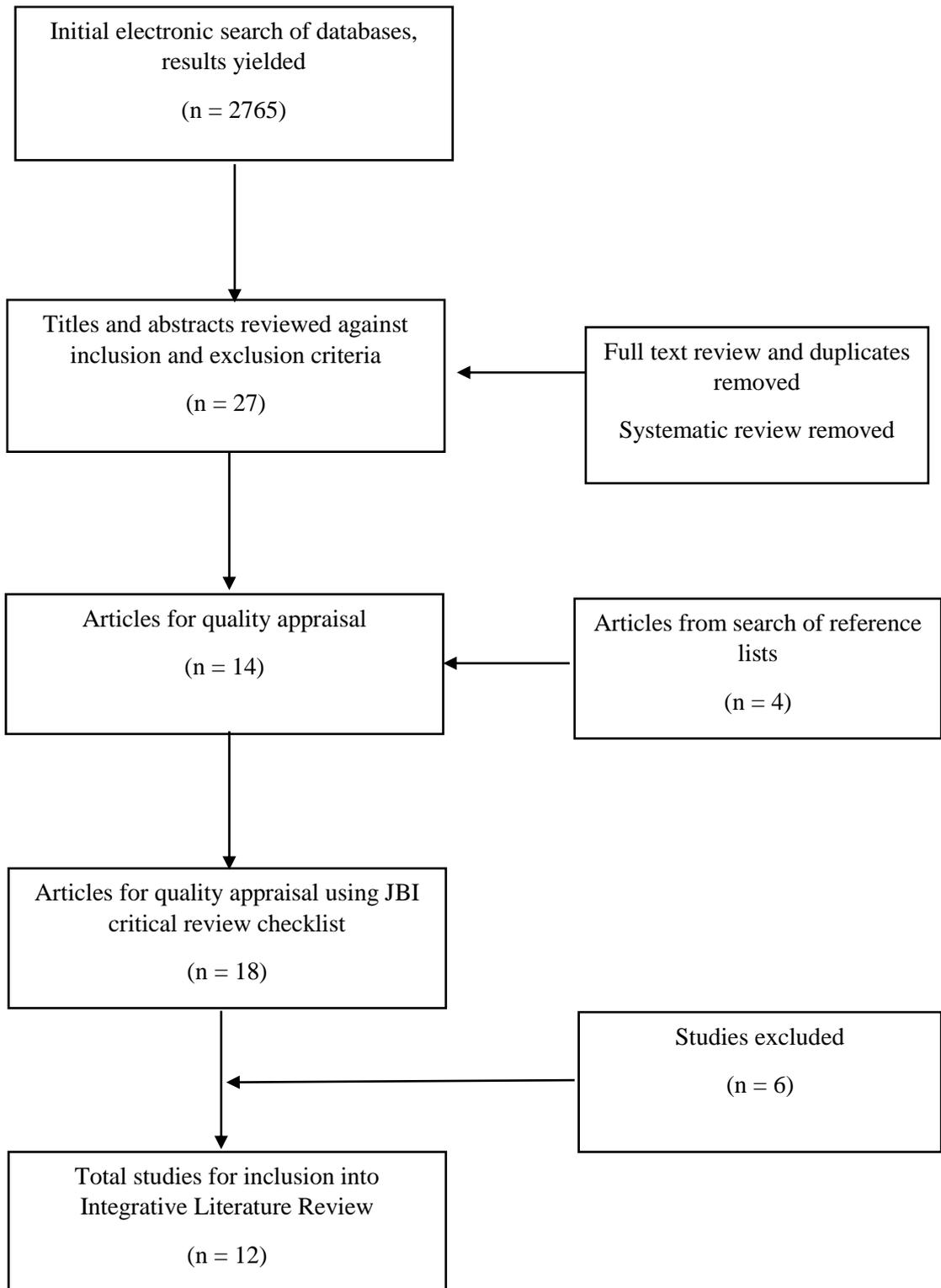


Figure 1 Reduction of literature flowchart

2.5 Critical appraisal

The quality appraisal process is essential for a review. The purpose of this process is to assess the identified studies, evaluate the study design and rigour to ensure appropriate steps have been taken decrease bias, and provide valid results for analysis which can be relied upon (Joanna Briggs Institute, 2017a). Eighteen articles were subject to the quality appraisal procedure.

Quality appraisal occurred as a two-step process, with potential articles first being assessed by the student researcher for inclusion using the Joanna Briggs Institute (JBI) critical appraisal tools for use in JBI systematic reviews (Joanna Briggs Institute, 2017b). This was followed up with a second assessment by a research supervisor, to ensure a rigorous process, so that only studies of appropriate methodological quality would be included for review. If the process was inconclusive between the research student and supervisor, this would have been discussed with a third reviewer for resolution. No disparities were experienced between the review parties, and all critiques were congruent for inclusion and exclusion. The design and methodology of each study was paired with the appropriate JBI checklist to determine to what extent it met the standards for inclusion in the overall review; inclusion criteria was set at 70% (Joanna Briggs Institute, 2017b). All studies assessed for inclusion met the 70% threshold (Appendix A). The following JBI critical appraisal checklists were used for critiquing: cohort, case series, qualitative research, quasi-experimental studies (non-randomized experimental studies), and case-control (Joanna Briggs Institute, 2017b) (Appendix A).

2.6 Data extraction

The JBI QARI data extraction form for interpretive and critical research (Appendix B) (Joanna Briggs Institute, 2014a), was used to develop a data extraction table suitable for this integrative review (Appendix C). Extracted data included information of the study descriptors including title, authors, year published, methodology and methods, phenomena of interest, setting, geography, participants, data analysis, results/finding, author and reviewer comments, level of evidence and credibility (Appendix D). This was to inform the identification of patterns for data analysis. Applying a level of evidence is an essential process for developing and implementing evidence-based

practice, as it provides a hierarchical system of classifying research evidence. The levels of evidence are ranked according to the probability of introducing bias which can be a result of the study design (Joanna Briggs Institute, 2018). For example, randomised controlled trials generally sit at the top of the hierarchy, as the strict study design can be planned to decrease bias and decrease the risk of errors. There have been many developments over time and modifications to the original levels, to recognise the expansion of specialities and the range of questions being asked (Burns, Rohrich, & Chung, 2011).

The JBI Levels of Evidence were selected for use to categorise the research articles (Joanna Briggs Institute, 2018). In addition to applying levels of evidence, a level of credibility was set to the overall study articles. These findings demonstrated by JBI included: unequivocal - findings beyond a reasonable doubt; credible - findings which are supported but without well-defined connection and could be open to differing interpretation; and unsupported - where the findings are not supported by the data. All included articles were applied a credible level of evidence (Joanna Briggs Institute, 2014b).

2.7 Data analysis

The data analysis of studies with multiple methodologies can be a complicated process, and if incorrectly planned it may result in increased bias, inaccurate results and decreased rigour (Whittemore & Knafl, 2005). To prevent this risk data synthesis followed the structure of thematic analysis described by Braun and Clarke (2006). This method was selected due to it allowing a level of flexibility when examining data across multiple methodologies, while providing a framework for data analysis, to aid an in-depth interpretation of the literature. Thematic analysis is a process of identifying themes and patterns from data to address the research question. A theme is identified by exploring the literature which has a meaning related to the research question (Braun & Clarke, 2006).

The thematic analysis followed the six phases described by Braun and Clarke (2006). The first aspect of thematic analysis began with knowing and engaging with the literature, exploring the data at length to begin to see patterns developing. Secondly,

initial codes were formulated across the data: codes are aspects of the data which are identified as interesting and relevant. Coding was done manually with the various codes colour coded to allow the grouping of relevant data.

Initial codes included:

- Delays in care
- Outlying impacting risk of experiencing a complication or emergency
- Increased risk of mortality and morbidity
- Communication deficits
- Availability of ward location, equipment and medication
- Geographical location, distance from home ward
- Familiarity and confidence
- Knowledge
- Transfers
- Length of stay
- Re-presentation and readmission
- Charlson comorbidity scores
- Weekend admissions

The initial codes were reviewed with the available supporting evidence and refined to the following categories:

- Delays in care
- Outlying impacting risk of experiencing a complication or emergency
- Increased risk of mortality
- Communication deficits
- Availability of ward location, equipment and medication
- Confidence familiarity & knowledge of treating staff
- Length of stay
- Re-presentation and readmission

Following the synthesis of data to inform the identified codes and categories, an in-depth analysis occurred by organising the various categories to identify emerging themes. At this stage, three themes were developed.

Initial themes were:

1. Potential failure of care.
2. Specialisation and the impact on outlying.
3. Risk to patients and healthcare providers.

Themes were retained to move into phase four - reviewing. All the themes were jointly assessed at this stage to ensure there was enough data to support them. Furthermore, the validity of developing themes was assessed to ensure they accurately reflected the data which informed them (Braun & Clarke, 2006). All themes were reviewed as accurate and reflective of the synthesised data. Finally, in phase five themes were refined, named, and precise definitions provided, This then allowed moving onto phase six, the production of the final report (Braun & Clarke, 2006), which is included in the findings and recommendations chapters.

2.8 Ethics

No ethical approval was sought due to the research following the process of an integrative literature review; ethics approval is therefore not required. However, throughout the appraisal process of selected studies, an essential element was an assessment for adherence to expected ethical principles, based on the research design. This occurred throughout the appraisal process to ensure the integrity of the research and findings.

2.9 Chapter summary

An integrative literature review was identified as the ideal method to explore the practice of outlying due to the ability to include studies with a wide variation of methodologies, across both quantitative and qualitative paradigms. Furthermore, it allowed an exploration of the research question from a variety of perspectives on what impact outlying has on patient outcomes.

Verified critical assessment tools by JBI were used to ensure only studies of a high calibre were used in the review process (Joanna Briggs Institute, 2017b), with only those above a 70% threshold included. The research process then followed thematic analysis described by Braun and Clarke (2006). Following confirmation of the 12 included studies, necessary data was extracted and synthesised to identify codes and categories for the development of three themes which were: potential failure of care, specialisation and impact on outliers and the risk to patients and health care providers.

In the following chapters critical findings of the included studies are presented, and the identified themes are discussed in relation to wider literature and the application to clinical practice.

Chapter Three: Findings

3.1 Introduction

The findings of the analysis and synthesis phase of the literature review are presented in chapter three. They are presented in a narrative style due to the multiple methodologies of the included studies, therefore excluding the possibility of a meta-analysis or meta-synthesis, as commonly seen in reviews with solely quantitative or qualitative studies respectively.

In this chapter, the characteristics, differences and similarities of the included studies are discussed in regard to study methods, population size, participants' age, the variation of included studies geography location and level of evidence. The six excluded studies are identified, and the reason for exclusion explained. A total of 12 studies met inclusion criteria, and the 70% threshold set from the critical appraisal tools. These studies underwent data extraction and data synthesis following the process of thematic analysis described by Braun and Clarke (2006). This inductive process informed the development of eight sub-themes, which in turn, underpinned the three overarching themes; potential failure of care, specialisation and the impact on outlying, and risk to patients and healthcare providers.

3.2 Characteristics of the included studies

3.2.1 Study design and methodology

The 12 studies included in the review used a variety of methodologies, including both quantitative and qualitative, each of which brings a different perspective to research findings.

Table 3.1 Summary of methodologies

Research Method	Design	N	Authors
Quantitative	Cohort	7	Alameda and Suarez (2009); Bai et al. (2018); Perimal-Lewis et al. (2013); Perimal-Lewis et al. (2016); Santamaria, Tobin, Anstey, Smith, and Reid (2014); Stylianou, Fackrell, and Vasilakis (2017); Stowell et al. (2013).
	Quasi-experimental	1	Hommel, Bjorkelund, Thorngren, and Ulander (2008).
	Case series	1	Francesco et al. (2015).
	Case-control	1	Liu, Griesman, Nisenbaum, and Bell (2014).
Qualitative	Phenomenology semi-structured interviews	2	Goulding, Adamson, Watt, and Wright (2012); Goulding, Adamson, Watt, and Wright (2015).

The list of studies is presented in table 3.1, all the included studies were peer-reviewed articles; cohort study designs was the most common methodology selected to investigate the impact of outlying on patients ($n = 7$), (Alameda & Suarez, 2009; Bai et al., 2018; Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014; Stowell et al., 2013; Stylianou et al., 2017). Notably, retrospective cohort was also a common study design employed.

Retrospective studies use available data for which research was not the original intention of collection (Mann, 2003); in the included studies they used data collected from the hospital bed management systems. For example, Perimal-Lewis et al.'s (2016) study spanned emergency department presentations from 2007 to 2014, by accessing retrospective data. Mann (2003) reports a benefit of this method is the ability to access historical data, therefore, the time to complete the study is simply that which is required to analyse the data. The limitation of this study design, however, is accessing datasets not designed specifically for the research purpose, which will be discussed in chapter four.

Investigating outlying by cohort study design was appropriate due to the potential ethical concerns which would arise with a randomised controlled study. Negative impact on patients and their overall outcomes could not be guaranteed to occur for an intervention group in a randomised control trial, thereby excluding the possibility of examining patient outcomes via this method (Mann, 2003).

Cohort studies are situated at level three in the JBI levels of evidence hierarchy, which is at the centre for their level of evidence for effectiveness table (Joanna Briggs Institute, 2018). Randomised experimental designs sit at the top tier of the level of evidence. This puts the majority of studies in a mid-level of evidence for effectiveness. Only one study sat higher on the JBI levels of evidence hierarchy and was by Hommel et al. (2008). This was a quasi-experimental study which was complex due to examining not only the impact of outcomes for outliers but also a comparison was made of patients treated within a new orthopaedic clinical pathway protocol and their recovery.

Two case-control studies used a matching process of aligning an outlier patient with a similar inlier patient. Liu et al. (2014) used a case-control matching process thereby matching each outlied patient with a patient treated on their intended ward. They were matched by diagnosis, admission shift and admitting physician. Stuart (2010), stated matching is a beneficial research strategy when there is an inability to randomise study subjects, and represents a process to balance the distribution of study participant variables between the intervention and control group, to allow precise analysis of intervention and outcomes. Similarly, Stowell et al. (2013) matched their control group, non-outlying patients, to an outlying patient by age (within five years), sex and reason for admission. This allowed a degree of congruency between the study participants and decreased potential variables amongst participants.

Two qualitative studies took a different approach by exploring the perspective of patients' opinion to outlying (Goulding et al., 2015), and the perception of staff members on safety issues and experiences of caring for outlying patients (Goulding et al., 2012). Both studies used semi-structured interviews, with questions based on a literature search and review. The use of direct quotes throughout was instrumental in allowing the reader insight into the decision making for the development of the research

findings, which elicit similar themes conveyed within the quantitative research. Qualitative research sits within a different table of JBI levels of evidence when compared to quantitative studies. Qualitative studies are within the level of evidence – meaningfulness table to assess the level of evidence as this varies between quantitative and qualitative. As each of the included qualitative studies are an individual qualitative study with its own phenomena under exploration these sit at level three. To have been granted a stronger level of evidence they needed to have been included in a synthesis or systematic review (Joanna Briggs Institute, 2018).

All the studies included in this review sit between level two and four, in the JBI level of quantitative effectiveness table and level three in the qualitative meaningfulness table. All the included studies met the credible level of evidence with no included studies linked to the unequivocal or unsupported level.

3.2.2 Participants

There was significant variance in population sizes across the studies. Across all the included studies the entire patient population including participants and patient records viewed was 163,887. Qualitative studies had small participant numbers of 29 (Goulding et al., 2012), and 18 (Goulding et al., 2015). Participant study size for the quantitative studies ranged from 39 matched pairs (Liu et al., 2014) to as many as 71,038 patient records examined by Stylianou et al. (2017). Depending on the study population and participants this can impact upon the results and study findings. If a study population is too small, it severely limits the ability to generalise the findings to other areas of population. In contrast, if a study population is too large, it may lead to overemphasising findings. Therefore, population selection should be a key consideration when planning and critiquing literature (Faber & Fonseca, 2014). This was acknowledged by Liu et al.'s (2014) study as a limitation due to the low sample size which limited the ability to determine statistical power to detect the quality of care adherence; with a larger sample size they hypothesised they could have gained more data for analysis, to more clearly define their findings with statistical power.

Whilst the speciality type of outlier was not always disclosed in the included studies, those who did identify this population were from the medical speciality, including internal medicine (Alameda & Suarez, 2009), general internal medicine (Bai et al.,

2018; Liu et al., 2014), internal medicine and geriatrics (Francesco et al., 2015), and medical (Stylianou et al., 2017). Considering the ageing population and rise of non-communicable diseases and increased incidences of long-term conditions requiring medical treatment (He et al., 2016), the incidence and importance of examining outliers from a medical patient or medical subspecialty can be understood when considering the current health climate and a potential rise in medical patients.

Table 3.2 Average age in years

Study	Outlier	Inlier
Alameda and Suarez (2009)	82.4	82
Bai et al. (2018)	71	72
Hommel et al. (2008)	Control Intervention	81.8 80.1
Liu et al. (2014)	68.4	66.9
Perimal-Lewis et al. (2016)	82.39	80.83
Perimal-Lewis et al. (2013)	69.7	72.7
Santamaria et al. (2014)	64	60.8
Stowell et al. (2013)	69	76
Stylianou et al. (2017)	68.62	66.18

The age of participants within the included studies was between 60.8 and 82.39 years which represents an older hospital population. When examining the average age of a patient between outlier and inliers across studies, six out of 10 participant groups from the studies which disclosed age were older in the outlier group (Alameda & Suarez, 2009; Hommel et al., 2008; Liu et al., 2014; Perimal-Lewis et al., 2016; Santamaria et al., 2014; Stylianou et al., 2017), compared with only four out of 10 from the inlier cohort (Bai et al., 2018; Hommel et al., 2008; Perimal-Lewis et al., 2013; Stowell et al., 2013). However, when considering the average age of participants across all studies there was minimal age variation between inliers and outliers (outlier average - 73.6 years, inlier average – 73.9 years).

Participants who were outliers were found more likely to have higher Charlson comorbidity scores from three studies which examined this finding, potentially indicating outliers as a sicker cohort of patients (Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014). This will be discussed in chapter four.

3.2.3 Geography

The included studies varied significantly in terms of geographical location. When attempting to distribute and generalise findings from a study, it is often difficult due to differences from one location or speciality to another. Therefore, when examining only one study, it limits the generalisability of the findings; to increase generalisability of a study it can be strengthened by selecting participants from differing sites, hospitals and communities to get a broad representation of the population (Polit & Beck, 2012). The review is strengthened by a wide range of study geographical locations from around the world including: Spain ($n=1$), (Alameda & Suarez, 2009); Canada ($n=2$), (Bai et al., 2018; Liu et al., 2014); England ($n=3$), (Goulding et al., 2012, 2015; Stylianou et al., 2017); Australia ($n=3$), (Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014); Sweden ($n= 1$), (Hommel et al., 2008); Italy ($n= 1$), (Francesco et al., 2015); and France ($n= 1$), (Stowell et al., 2013).

The majority of studies described the hospital setting in which they conducted their study, including a variation of either the number of beds available or noting the population size which the hospitals serviced, or number of emergency department presentations. Bed numbers ranged from hospitals between 440 to 1100 beds. Eight studies had a similar bed capacity (between 440 to 513), providing a similarity of hospital sites between the studies (Alameda & Suarez, 2009; Bai et al., 2018; Francesco et al., 2015; Liu et al., 2014; Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014; Stylianou et al., 2017). Goulding et al. (2012) study site had a bed capacity of 1100 beds, while Goulding et al. (2015), Hommel et al. (2008) and Stowell et al. (2013) were the only studies which did not identify their bed population capacity.

3.3 Excluded studies

Six studies were excluded following quality appraisal as they did not meet the required criteria and the threshold for inclusion (Creamer, Dahl, Perumal, Tan, & Koea, 2010; Lepage et al., 2009; McAlister & Shojania, 2018; Ranasinghe, Fleury, Peel, & Hubbard, 2017; Warne et al., 2010; Williamson, Ghazaly, Bhatt, & Nehra, 2015). The reasons for exclusion are discussed below.

Creamer et al. (2010) undertook an observational study to examine activities undertaken on ward rounds with attention to the impact on outlying patients. Their study was excluded as it only examined the activities undertaken on ward rounds and the time spent on activities, such as that taken spent travelling to visit an outlier. It did not directly examine any direct outcomes to the outlier patient themselves. They concluded that increased time is required when visiting outlying patients and visiting other wards, and this may be a factor in delivering patient care. This was similar to Ranasinghe et al. (2017), who completed a retrospective matched cohort study examining the impact of multiple bed moves for older inpatients. This study focused on the impact of bed moves on patients comparing General Internal Medical patients to Older Person Evaluation Review and Assessment (OPERA) patients. Thus, lacking distinction of inlier and outlier in the bed moves. Similarly, Williamson et al.'s (2015) study was a logistical data capture of patient admission and patient movements. There were few aspects of the study design provided in the article including no exclusion criteria, no reports of patient demographics and no statistical analysis. Although it provided data on ward movements, it did not examine the impact on patient outcomes of those movements and was therefore excluded.

Although the study was interested in outliers, the primary focus of Lepage et al.'s (2009) study was on the use of a risk analysis method to improve patient care to those who were outlied. Their study reiterated findings from the included studies in this review regarding constraints to hospital bed capacity resulting in the practice of outlying, and noting that within the included hospitals, a key goal examined was how to improve the care for outlying patients. They used a failure modes, effects and criticality analysis (FMECA) to identify vulnerabilities within the system when concerning outliers, which could be improved. These findings could be used to provide improved practice when caring for outliers, however as it was a risk analysis and did not analyse the direct outcomes of outliers it was not included in the review process.

The study by Warne et al. (2010) was also excluded as outliers were not the primary investigation. There was a finding of medication management and outliers although this was extremely minimal and not the overall focus of the point prevalence study, instead examining medication administration in medical and surgical patients. Finally,

McAlister and Shojanian's (2018) article was excluded as it is a review article of Bai et al.'s (2018) study.

3.4 Themes

Eight subthemes were identified as a result of the data analysis and synthesis, from which three themes arose (Figure two). These included: potential failure of care (14 findings), specialisation and the impact on outliers (7 findings), and the risk to patients and healthcare providers (9 findings). Each of the themes and the respective subthemes are discussed below.

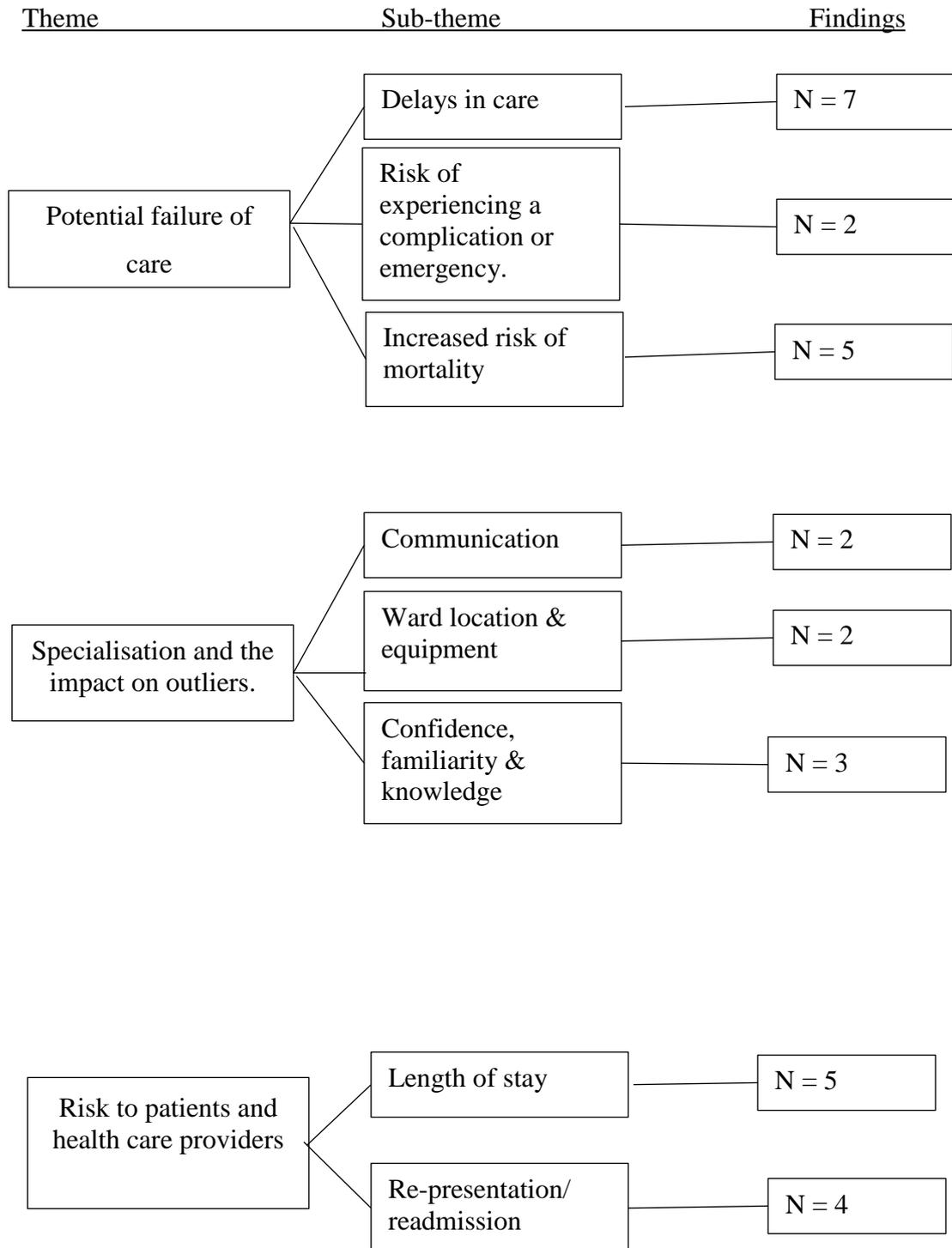


Figure 2 Overview of themes

3.4.1 Theme one: Potential failure of care

Theme one encapsulates 14 findings from eight studies (Bai et al., 2018; Francesco et al., 2015; Goulding et al., 2012, 2015; Hommel et al., 2008; Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014). A common finding across eight of the included studies were aspects of nursing and medical care which were potentially delayed for patients placed as outliers, combined with an increased risk of experiencing complications, the need for emergency calls with an associated increased mortality risk. All these factors combined show an overall potential failure of care which may impact on patient care and outcomes. With adequately planned, and timely nursing and medical care, practitioners strive to decrease potential complications, as complications place the patient at undue risk to morbidity and mortality. Each subtheme has an onward effect which could affect patient outcomes, as a potential systematic failure to the patient under care.

3.4.1.1 *Subtheme: Delays in care*

Six studies found evidence of delays in aspects of care (Goulding et al., 2012, 2015; Hommel et al., 2008; Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Stowell et al., 2013). One noticeable delay was for outliers not having their discharge summaries completed prior to discharge from the hospital. Outliers were also at an increased risk of having their discharge summaries not completed within two days of discharge (Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013). The potential flow-on effect could impact care for patients within the community thereby delaying continuity of care when required for community services (Perimal-Lewis et al., 2013). Other care delays included lags in operative management of orthopaedic injuries (Hommel et al., 2008), as only 48% of outlier patients with orthopaedic injuries received their operation, compared with 60% of inliers within a 24-hour period.

An additional delay or neglect in care was a portion of patients receiving a prescription for low molecular weight heparin. A higher proportion of inlier patients, for example, received a prescription for low molecular weight heparin (31%), compared with outliers receiving prescriptions (24%) (Stowell et al., 2013). A further finding from the outlier population, examined retrospectively once outlied, was that on presentation to emergency departments they were more likely to be triaged under an Australasian Triage Scale (ATS) 5 category (Perimal-Lewis et al., 2016). In this category, patients

are considered less critical, and there is expected to be no significant impact on their outcomes if their commencement of treatment is delayed for up to two hours.

Goulding et al. (2012), discussed the challenge of caring for patients from varying specialities having interviewed staff across medicine, surgery, care of the elderly, orthopaedics, head and neck, and gynaecology. They discuss the challenge of multiple speciality cares on one unit and how the patient distribution impacts on patient care. Diverse specialties requiring different attention and care could therefore compete with one another for patient care time, which may potentially impact on patient safety. Goulding et al. (2012) used the example of patient groups deemed difficult to care for such as, medical patients requiring intense support needs for toileting or supervision due to a risk of wandering, with competing needs for post-operative patients who require regular observations. Trying to care for both specialties may require one group to wait, thereby resulting in delays in aspects of their cares. One point discussed in both qualitative studies was the delay in medical reviews, as outlying patients were often seen after the inliers. This resulted in speculation of a delayed review of conditions and diagnoses, and the potential impact that this may have on ongoing patient care and the ability to detect deterioration before it occurs (Goulding et al., 2012, 2015). Patient participants also identified a lack of consistency when being reviewed by medical staff, seeing multiple doctors, and no regularity or not even seeing them for a few days, and feeling ‘forgotten’ while on the outlying ward (Goulding et al., 2015). Some participants raised the concern care was compromised when outlied due to limited access to medications and being required to wait for medical staff members to visit the outlied ward to prescribe medications, or medications not being present on the ward. Delays in medication management and medical reviews ultimately could lead to delayed care (Goulding et al., 2015).

3.4.1.2 Sub-theme: Risk of experiencing a complication or emergency.

Two findings from two studies identified risks associated with outlying and experiencing either a complication or emergency (Hommel et al., 2008; Santamaria et al., 2014). In Hommel’s (2008) study, incidences of postoperative complications were found between patients experiencing complications when treated as outliers from the orthopaedic department, versus those who were treated on the intended orthopaedic unit. Significant complications were experienced by 60.5% of outliers compared to

48.7% on the orthopaedic ward within the intervention group. The authors investigated a number of complications and followed up the participants or their proxy at four and 12 months. They were interviewed, and if there were ongoing complications, these were noted. More patients treated as outliers were impacted by cardiac failure and urinary tract infections. Similarly, the study by Santamaria et al. (2014) displayed significant findings on the impact of outlying in relation to the number of emergency calls patients experienced, with an outlier more likely to require an emergency call. They found 87% of emergency calls occurred while the patient was away from their home ward and when a call did occur the patient was more likely to suffer a cardiac arrest. In an overall post statistical adjustment, it was estimated that outlying was associated with a 53% increase in emergency calls. Hommel's (2008) finding is complicated due to being found in the study intervention group which was following a new orthopaedic pathway; it is difficult to ascertain the findings as related solely to outlying or related to the orthopaedic pathway implemented.

3.4.1.3 Subtheme: Increased risk of mortality

An increased risk of mortality was a finding in five studies, identified as a risk to outlier patients (Bai et al., 2018; Francesco et al., 2015; Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014). Perimal-Lewis et al. (2016) identified an increased risk within the first 48 hours of admission and queried whether outliers received a lower standard of care. This was also reported by Perimal-Lewis et al. (2013) with an increased risk of mortality within 48 hours at 50.4% for outliers, versus 22.4% for inliers, and an overall increased risk of mortality for outliers of 4.5% versus 3.5%. Santamaria et al. (2014) followed the trend with reported risks to outliers mortality rates. Similarly, within the early admission phase, Bai et al. (2018) also identified an increased risk to outlier patient mortality, which was three times higher when compared to inliers in the first week of admission. This risk, however, decreased by week three, potentially suggesting a relationship between a decrease in the potential risk over time. Of note, Francesco et al. (2015) discovered post statistical adjustment, indication that patients who were outlied into surgical wards (compared with medical), the risk of death was twice as high for outlied patients (Francesco et al., 2015).

However, Alameda and Suarez (2009) found no significant differences to in-hospital mortality or morbidity in patients outlied and admitted with heart failure. Whilst

mortality was not affected, the practice of outlying did impact on readmission rates discovered by Stylianou et al. (2017) which is discussed in theme three.

3.4.2 Theme two: Specialisation and the impact on outliers.

Three of the studies discussed points concerning the challenge of caring for patients who are under the care of staff not familiar with the patient's conditions: they lack the experience, knowledge, equipment and the ability to communicate with a team they may not know, or where the team are as they are not based on the same ward location (Goulding et al., 2012, 2015; Hommel et al., 2008). As medical care advances the differences between medical specialities grows and care becomes more specialised. This can complicate caring for patients across two specialities as the required knowledge to provide effective care differs. (Cassel & Reuben, 2011). When outlying this creates a challenge for healthcare staff to provide care for patients not commonly treated within their speciality area. Seven findings across three studies informed the subthemes; communication, ward location and equipment, and confidence, familiarity and knowledge (Goulding et al., 2012, 2015; Hommel et al., 2008).

3.4.2.1 *Subtheme: Communication*

Communication is known to be an essential facet of health care, as effective communication allows for the discussion of patient conditions, plans and interventions. Ineffective communication can result in a raft of adverse impacts on patients, delayed treatment, misdiagnosis, medication errors and injury. In the worst-case scenario, miscommunication could result in significant patient harm and death. There is significant literature surrounding the importance of effective health professional collaborative communication (Foronda, MacWilliams, & McArthur, 2016). Effective communication from the health professional, to the patient also positively influences the relationships between parties. Enhanced understanding of treatment plans through communication improves essential patient outcomes, patients feel satisfied with treatment plans and therefore are more likely to participate and adhere to treatment plans (Levinson, Lesser, & Epstein, 2010).

Two studies identified the importance of communication from both the health professional and the patient perspective (Goulding et al., 2012, 2015). Goulding et al. (2012) examined the perspective of staff and identified they were less able to

participate in informal communication when discussing outlying patients. The treating medical teams were either not geographically present, were not familiar with each other, or they did not know who to contact to discuss a deterioration. They identified outlying as a barrier to effective communication, and ultimately a communication breakdown which may inadvertently place the outlied patients at risk.

From the perspective of the patient, communication was identified as a safety concern, and that a lack of information was provided to them. Participants reported difficulties in having the reason for outlying explained and what this meant for their ongoing care. Participants conveyed that delayed medical reviews increased anxiety, and an improved level of communication would have been one factor in allaying their fears and isolation whilst outlied, as it was difficult to get information regarding their diagnosis and treatment plan from treating clinicians (Goulding et al., 2015). Considering the importance of communication in health care, the identification of a communication breakdown while outlied indicates a potential safety concern inherent in the practice of outlying.

3.4.2.2 Subtheme: Ward location and equipment

The geographical location of the home ward and outlied ward was identified by both staff and patients in the two qualitative studies (Goulding et al., 2012, 2015). From the staff interviews, the impact the distance between the two wards had on multiple factors was discussed. For example, the distance for medical teams to travel to visit the patient and the delay in medication management, because if the ward was a significantly different speciality they might not stock the correct medications, thus delaying medication administration (Goulding et al., 2012). Furthermore, there were delays in getting prescriptions and ordering medication not commonly stocked on the outlied wards (Goulding et al., 2015). This informs the implication of the practice of medical specialisation and the requirement of different equipment and medications to safely treat and care for a range of patients and their associated conditions.

3.4.2.3 Subtheme: Confidence, familiarity and knowledge

Three findings across three studies (Goulding et al., 2012, 2015; Hommel et al., 2008), encompassed the subtheme surrounding confidence, familiarity and knowledge which impacted on the care provided to outlying patients. Hommel et al. (2008) identified an

administrative delay in 40% of outliers when organising care for patients with hip fractures, compared with 33% of inliers. It was surmised this could be due to staff on non-orthopaedic wards not being as familiar with organising the care for patients who have sustained a hip fracture. Patients with fractures need to have planned regular, careful mobilisation and positioning, something which staff caring for these patients on outlying wards may not be familiar with (Hommel et al., 2008).

Goulding et al. (2012) also discussed the issue that due to the increasing rate of specialisation in healthcare treating teams may not be as familiar with treatment protocols or medications. Therefore, causing delays in care and increased risk of errors. Those staff who commonly care for patients of one medical concern or condition may be more attuned to pick up signs and symptoms of deterioration earlier, than someone who is not as familiar with the condition, and the potential early warning signs. This also relates to the idea of knowledge impacting on nursing care. Participants of Goulding et al.'s (2015) study identified that they were unsure of the care they would receive while outlied due to the lack of specialist staff input and expertise. This is related to the understanding of patient conditions, although staff are familiar and knowledgeable about the conditions which they treat daily, there was a concern raised when considering the specialised nursing care required for outlied patients and the required knowledge to treat patients across multiple specialities. Not understanding specific specialised details of patient care due to a lack of knowledge was said to result in poor understanding of safe mobilisation, for example, resulting in minor mistakes in care.

3.4.3 Theme three: Risk to patients and healthcare providers

Providing health care has a cost in monetary terms to the provider and in terms of the patient experiencing a period of unwellness and the impact this has on their overall life. The length of time a patient needs to stay in the hospital, and if they then experience a deterioration at home after discharge, this can lead to re-presentation to emergency departments and readmission. This creates a disruption to a patient's life which cannot be rationalised solely with financial allocation; there are costs beyond money which encompasses the impact of hospital stays on the patient and their family. Each day that a patient is in the hospital, the cost of caring for that patient increases, as do the risks of complications. Two subthemes length of stay and re-presentation and/or readmission

comprise this theme with nine findings spanning nine studies (Alameda & Suarez, 2009; Francesco et al., 2015; Hommel et al., 2008; Liu et al., 2014; Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014; Stowell et al., 2013; Stylianou et al., 2017).

3.4.3.1 Subtheme: Length of stay

One of the most commonly measured outcomes across all the studies was the length of stay associated with being an outlier. Eight studies presented findings relating to patient actual or estimated length of stay (Alameda & Suarez, 2009; Hommel et al., 2008; Liu et al., 2014; Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014; Stowell et al., 2013; Stylianou et al., 2017). With five finding either an initial or overall increased length of stay associated with being an outlier (Alameda & Suarez, 2009; Hommel et al., 2008; Santamaria et al., 2014; Stowell et al., 2013; Stylianou et al., 2017).

Increased length of stay was supported by Santamaria et al. (2014), Stowell et al. (2013), and Stylianou et al. (2017). Specifically increased length of stay was linked to a more extended stay of 2.6 days in hospital (Alameda & Suarez, 2009). Hommel et al. (2008) found an extended length of stay in both acute hospital and rehabilitation units for post-operative orthopaedic patients. The difference was an additional 3.7 days in an acute hospital and 13.6 days in rehabilitation care. At 12 months this statistical significance decreased to exerting no difference.

Not all the included studies were conclusive about the impact of outlying on extended hospital admissions. Three studies instead reported a reduced length of stay: Perimal-Lewis et al. (2016) found reduced length of stay for outliers, a similar finding in Perimal-Lewis et al. (2013) where the diagnosis-related group (DRG) based mean predicted length of stay was similar at 5.98 days for inliers and 5.72 for outliers. Liu et al. (2014), also supported this finding with a similar length of stay with 4.9 days for outlier versus 6.0 inlier days.

Five studies found a relationship between outlying and increased length of stay versus the three opposing. This, therefore, brings concern that outlying may well be an implication for increased length of stay. Of interest Perimal-Lewis et al. (2013)

discussed that a reduced length of stay did not necessarily equate with an improved quality of patient care and readmission probabilities should be considered for the successful treatment and discharge of the outlied patient.

3.4.3.2 Subtheme: Re-presentation and/or readmission

Four studies reported findings of impact on re-presentation and readmission rates of those treated as outliers (Francesco et al., 2015; Liu et al., 2014; Stowell et al., 2013; Stylianou et al., 2017), with only one finding a lower risk (Perimal-Lewis et al., 2013). Liu et al. (2014) reported outliers returning to the emergency department within 6.5 days of discharge compared to 8.0 if they were discharged from the home general internal medicine ward. Outliers had higher readmission rates within 90 days (Francesco et al., 2015), higher rates of readmission (26% readmitted within 28 days compared to 17%) (Stowell et al., 2013), and a statistically significant risk of readmission probabilities found by Stylianou et al. (2017), where 11% of readmissions in their study were patients who had been outlied at a stage of their patient journey. The only study to dispute this finding was Perimal-Lewis et al. (2013) who reported outlier status did not significantly impact the risk of readmission, instead finding reduced risk of readmission within 28 days of discharge.

3.5 Chapter summary

This chapter focused on the studies which were included in the literature review, examining the differing characteristics including: study design and methodology, details of the study participants, and geography. There was a range of quantitative and qualitative study designs, but cohort study design was the most common methodology used to investigate the practice of outlying.

The age of combined study participants across inlying and outlying groups ranged from 60.8 years to 82.4 years, representing an overall older hospital population. However, when considering the overall average age difference between outlier and inliers across all the studies, there was only a slight variation. The overall average age between outlier and inlier groups was 73.6 years and 73.9 years respectively. This is reflected by the minimal age range variation across the inlier and outlier groups. A strength of the included studies was the variation of geographical location from a variety of health

systems around the world. The three themes: potential failure of care, specialisation impact on outliers, and the risk to patients and healthcare providers were explored in relation to the findings from the data extraction, and synthesis phase of the thematic analysis. In the following chapter these themes are discussed in relation to the current healthcare context, and how the practice of outlying can be safely accomplished, is explored in terms of applying this custom to practice. Finally, future research is recommended to inform further and safely facilitate the practice of outlying.

Chapter Four: Discussion

4.1 Introduction

In this chapter a discussion of the findings from the integrative review process is undertaken and linked to the wider literature surrounding outlying, and the care of patients within their intended department. The purpose of this review was to explore the literature to establish if the practice of outlying patients to a department other than their intended admitting space is detrimental to patient outcomes, and therefore a risk to the patient.

Outlying as a solution to bed management crises has inherent risks both to patients within the system, and to the health care provider. It is a practice which should be considered with caution and avoided when possible, however, it is likely a practice difficult to discontinue within the current healthcare climate and constraints. Therefore, it is important to consider how to minimise the risks associated with outlying.

Over recent years within hospitals, there have been the development of quality indicators to provide information and data on the quality and safety of care delivered. Three of the most important quality indicators identified have been: unexpected long length of stay, unplanned readmission, and higher than expected mortality (Borghans et al., 2014). Coincidentally, these indicators comprise parts of the three themes in this review which have been identified as of increased risk in the practice of outlying patients. All three indicators can have far-reaching and consequential impacts on patients and the healthcare provider.

The patient outcomes within the review were focused on but not limited to length of stay, readmission rates, patients' perception of care, and communication between healthcare professionals and patients. Critically, additional impacts became apparent including the risk of experiencing a complication or emergency, delays in care, and the risk to mortality.

Three themes emerged from the data. Namely: potential failure of care, specialisation and the impact on outliers, and risk to patients and healthcare providers. Discussion will

follow the three themes. Theme one the potential failure of care focuses on the challenge of providing care to patients who are outlying, and the impact outlying can have on patients. Theme two will discuss how advancing medical specialisation has impacted on the safety of the practice of outlying, and in turn what impact specialisation has on effective communication across teams and ward locations. Before discussing theme three around how outlying increases the risk to patient and the healthcare provider, by how a patient's length of stay relates to the risk of developing complications throughout the treatment process, and how outlying potentially impacts readmission rates, in addition the cost of providing additional care is examined.

Finally measures relating to outlying are reviewed including: the potential impact Charlson comorbidity scores could have on assessing outlier risk, how the findings of Lepage et al.'s (2009) risk analysis study is relevant to the care of outliers, and how the Swiss cheese model could relate to outlying.

4.2 Potential failure of care

4.2.1 Provision of care

The provision of timely and appropriate care is essential to meet the ideal outcomes for patients. Six studies found evidence of aspects of delayed care which impacted patient outcomes, within these studies precise aspects of care were delayed, which when considering pathophysiology and functioning, could have a detrimental impact on patient outcomes. In association with delays in care, the risk of complications was raised alongside with increased mortality risk.

The study by Hommel et al. (2008) found associated delay in the operative management of orthopaedic injuries in patients who were outlied. This is a noteworthy finding when considering the context of orthopaedics, and the implication an operative delay can place on the patient. Within the orthopaedics field of medicine, a hip fracture, especially in the elderly population is considered to significantly increase the risk of death and is a leading cause of patient morbidity (Foster, 2017). There is documented literature, including a systematic review by Simunovic et al. (2010) that indicates that the longer the wait time for operative management, the increased risk of experiencing surgical complications. Therefore, operative management with no delay can, in turn,

lower the mortality risk and risk of post-operative complications (Simunovic et al., 2010). Risk of experiencing a complication following a hip fracture is most significant within the elderly population and with delayed management can promote the risk of developing pneumonia, or a urinary tract infection (Caesar, Karlsson, & Hansson, 2018). The latter was one of the complications identified in this review for which outliers were at more risk of than inliers (Hommel et al., 2008). With an increasingly elderly population, there is the possibility of seeing common presentations associated with ageing more frequently, and one of those risk factors is falling and sustaining a fracture (Foster, 2017). This increased risk of occurrence highlights the importance of prompt operative management (Simunovic et al., 2010), and postoperative mobilisation with no associated delays to preserve function and aid rehabilitation (Maher et al., 2012), for all patients whether on the intended ward or outlied.

Stowell et al. (2013) identified fewer outlier patients received a prescription for low molecular weight heparin. Venous thromboembolism is a common cause of death worldwide of patients admitted to hospital, which can be avoided with effective prophylactic treatment and management (Ho & Litton, 2011). Without the use of prophylactic treatments, rates of venous thromboembolism on patients admitted to a general ward can increase to between 10-26% of patients. The importance of prophylactic treatment, particularly in elderly medical patients is essential due to an increased risk factor. Thrombosis risk increases with age from 1 in 10,000 per year for those aged 40 and younger, to 1 in 10 people aged 75 years and over (Abdel-Razeq, 2010). Therefore, the importance of appropriate prescription charting of prophylactic treatment is essential for inlier and outlier patients.

The practice of outlying was identified as resulting in delays in prompt patient discharge summaries (Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013). A discharge summary is a mode of communication between in-hospital services and community providers, such as general practitioners. Moreover, these allow the flow of information to ensure continuity of care and the identification of concerns to prevent deterioration and reduce readmission rates (Cresswell et al., 2015). Elderly patients often have multiple comorbidities and medications (National Audit Office, 2013), therefore, this mode of communication is essential to keep general practitioners up to date with current concerns and treatment. Discharge summaries ensure clinical

decisions are made with up to date knowledge and findings, thereby making the best decisions for the patient (Katikireddi & Cloud, 2009). Without this communication, errors and inappropriate treatment may precipitate unnecessary complication to outlier patients, which are avoidable.

4.3 Specialisation and the impact on outliers

4.3.1 Medical specialisation

There has been an exponential change within the last two centuries in the practice of, and development for the provision of healthcare. Diagnostics, treatment options and technology, have grown, along with the age of patients and the complexity of their conditions (Cassel & Reuben, 2011). There has also been a shift toward treating patients with a shorter hospital stay, or as day case patients (National Audit Office, 2013). In response to this change, medical practice has become more specialised with practitioners having in-depth understanding and knowledge of key, but narrow areas of practice (Cassel & Reuben, 2011). Specialisation in medical care can be linked to three key factors; this includes advances in medical science and technology, economic considerations and professional preference. In the United States alone there has been notable growth in the number of speciality boards to certify speciality and sub-specialty areas of medical practice from 18 in 1960, growing to 158 in 2011. This shows the advance to individualistic medical care and practice (Detsky, Gauthier, & Fuchs, 2012).

Over time there has been developing concern around the fragmentation of medical care due to specialisation and the impact that will have on the patient (Cassel & Reuben, 2011). Each aspect of care and treating conditions becomes compartmentalised to its speciality, with individual key treatment providers who are experts within their field (Council of Medical College in New Zealand, 2013). Over specialisation may lead to misdiagnosis and result in inappropriately managed care for those with significant comorbidities and chronic conditions. This may have several impacts including increased cost to provide care, with an increased use of resources, broken and fragmented care with discontinuity across providers, increased rates of cross-referrals, and reduced access to specialists for those who are in rural or provincial areas (Council of Medical College in New Zealand, 2013).

With the growing divergent practices in medical care, this then links to the concern of the practice of outlying a patient, especially if the patient is outlied from one primary specialty to another, with significant variation in practice and treatment protocols. Goulding et al. (2012) discussed this detail and how the lack of speciality knowledge of the treating staff on the outlied ward could have a detrimental impact on outlied patients' outcomes. At a nursing level to be able to provide sufficient patient care, literature shows that the provision of well-educated nursing care is fundamental, as correct knowledge and care can decrease patient mortality (Aiken, Clarke, Sloane, Lake, & Cheney, 2008). However, as treatment and care become more distant with specialisation, even the split between medical care and surgical care grows, leading nurses and medical teams to develop precise assessment and treatment skills. The impact for a patient who is outlied from a surgical ward area to a medical ward can have consequence on patient care, as nurses on medical wards may not be familiar with surgical treatments, such as wound care, and may not have the necessary equipment available (Williamson et al., 2015).

One area of practice which has become highly specialised, for example, is the treatment of those who have had a stroke, and the provision of treatment of these patients with highly trained staff on specialised stroke units. This is a well-researched area of practice, between the impact of treating stroke patients on specialised stroke units versus general medical or geriatric wards (Canavan, Ni Mhaille, & Mulkerrin, 2012). This presents similarities to the treatment of patients on their intended speciality unit versus unintended wards.

Stroke is one of the leading causes of adult disability, and the second most common cause of death and mortality around the world, causing a significant socioeconomic burden for healthcare systems (Csiba & Farkas, 2009). With an impending older adult population so too are the expected cases of stroke. Total stroke costs are expected to rise by 50% in 2021 compared to 2007 within the United Kingdom (Canavan et al., 2012). To aid offsetting this cost and improve morbidity and mortality results, has led to the development of specialised dedicated stroke units to care for stroke patients with pre-set objective clinical pathways. They are cared for by a specialised multi-disciplinary team trained in providing specialised stroke care from admission, treatment and discharge (Csiba & Farkas, 2009). The development of this practice has been

studied, and research is beginning to show the beneficial impact of treating patients on these specialised units. This includes improving survival and level of independence, reducing the risk of readmission and reducing the overall hospital length of stay. There is also a possible reduced risk to mortality. However, this requires further research to be entirely conclusive (Sun, Paulus, Eyssen, Maervoet, & Saka, 2013).

Although an outlied patient may not have the same level of specialised care requirements of a stroke patient, with the increasing specialisation of healthcare, aspects of care are becoming more particular and detailed across specialities with developing treatments and condition-specific medications (Cassel & Reuben, 2011). Full knowledge of all these is impractical if working on a ward which does not commonly use specific medications or treat different conditions apart from their own speciality. With the developing evidence of the benefit of treating stroke patients on their intended specialised units (Canavan et al., 2012), this could support increased research into the practice of outlying patients from their intended speciality. One may conclude that if the patient with a complex condition treated on an intended speciality ward is outlied, being outlied may be a detriment of the provision and outcomes of care, due to lacking the specialised input that came with the intended wards medical and multidisciplinary team.

4.3.2 Communication and ward location

One way to promote the effective provision of care to patients in an advancing speciality lead practice is through the proper management of patient care. To facilitate proper patient care, it is essential to have effective communication between all the treating parties (Council of Medical College in New Zealand, 2013). Inadequate communication was identified as a safety concern with outlying due to a lack of information provided to patients and families regarding their care (Goulding et al., 2015), and insufficient communication between staff and the medical teams, possibly relating to team familiarity and geography of ward locations (Goulding et al., 2012). Without proper communication many aspects of missed care may be evident, treatment delay and misdiagnosis, possibly resulting in adverse impact or harm to the patient (Foronda et al., 2016). Moreover, effective communication between the patient and healthcare providers is essential for the patient to contribute to their healthcare (Levinson et al., 2010).

One approach, which is beginning to be integrated into medical practice today, is the use of person-centred care (Ekman et al., 2011). Person-centered care is a philosophy of partnership between patients and treating medical teams. The development of this philosophy of partnership has resulted in the ability to ensure agreement and collaboration for the development of treatment plans between parties, improve patient outcomes, and exhibit growth in patient satisfaction. Person-centred care has led to a paradigm shift from a model where the patient was a passive participant in their health care, instead moving to a framework where the patient has active involvement in the decision making and planning processes with their health care team (Ekman et al., 2011). This model could be an essential integration into patient care to ensure effective communication when a patient is outlied. For successful treatment the patient needs to have understood their condition and treatment plan, and to be an active participant in their care. Success of a collaborative communication process ensures an ongoing partnership between the provider and patient, regardless of treating location (Levinson et al., 2010).

The practice of outlying may result in patients under one specialty team being across multiple wards. This geographical distance and space can have an impact on the ability for staff to undertake rounds, and review their patients as ward rounds become distributed across a hospital (Williamson et al., 2015). The staff (Goulding et al., 2012) and patients (Goulding et al., 2015) in the two qualitative studies acknowledge the impact the distance between wards had on outlying patient medical reviews, and medication management. More time is required to travel between locations, resulting in doctors having less time to spend with patients, and decreased ability to provide effective care to those who are outlying, versus those who were on the intended ward (Williamson et al., 2015). A study undertaken at Auckland City Hospital to investigate the time spent to round on patients found that 18% of the time on ward round was spent walking and that most of that walking time was spent on visiting patients who were outlied (Creamer et al., 2010). This study highlights the additional time reviewing outlying patients requires, potentially meaning less time available to be spent on patient review and management.

Within theme one, the impact of delayed care was a key focus point as the impact of delayed medical consultation was a further factor identified and discussed as creating

increased risk of adverse outcomes to the outlied patient. Delay may be in either initial contact and examination at the time of arriving at the outlied ward or delay when sent to an outlying ward from their point of admission from the emergency department. Stowell et al. (2013) and Stylianou et al. (2017) both examined the impact of delayed medical contact in their respective studies. Stylianou et al. (2017) considers the impact of inadequate contact with medical and nursing staff throughout the outlied period and takes into consideration that outliers are often the last patients to be reviewed by the medical staff and visited at the end of the day. They concluded that this ultimately has an impact on the management of outlier's patient care, as inevitably time is then limited. With decreased time the potential for inadequate in-depth assessment and management plans to be developed needs to be noted. Furthermore, if reviewed at the end of the day many nursing tasks and processes have already occurred, laboratory requests may have been completed, and ward secretaries may be finished, consequently delaying administrative processes (Alameda & Suarez, 2009).

4.4 Risk to patients and healthcare providers

4.4.1 Length and stay and associated risk of complications

Within healthcare, every attempt is made to keep the patient well and avoid potential complications which may delay discharge, or impact mortality and morbidity. Entering a healthcare facility automatically predisposes a person to risk factors and complications (Lim, Doshi, Castasus, Lim, & Mamun, 2006). This is an essential consideration for significantly unwell patients and the elderly, as they may already be presenting in a weakened state. Complications can have far-reaching effects, not only to the patient experiencing them. A patient experiencing a complication in care can activate the ongoing use of hospital resources, and lead to additional admission time (Almashrafi & Vanderbloemen, 2016). Hospitals are an ever-changing system, a complex flow between admission, treatment and discharge, each patient requires differing attention, staff and resources. This makes managing the flow of patients a challenging balance (Wong et al., 2010). An increased rate of complications and the risk of emergencies was identified as an occurrence to those who are outlying, including more patients experiencing postoperative complications including cardiac failure and urinary tract infections (Hommel et al., 2008), and increased risk of an emergency call and cardiac arrest if outlying (Santamaria et al., 2014).

In addition, the length of time a patient spends in hospital can have long-ranging impacts and consequences. The longer the admission resulting from delay to facilitate discharge home or to community services, increases the potential for experiencing complications and adverse events (Hauck & Zhao, 2011). A potentially increased length of stay was identified as associated with the practice of outlying. Delayed discharge from hospital increases the cost to the hospital providing a bed to the patient; it increases the risk of the patient experiencing complications which could also push up the cost of treatment. The delayed discharge of patients has shown to have substantial costs in England, within the National Health Service; delayed discharge costs are calculated at approximately one hundred million pounds per year, and 1.2 million bed-days were lost when examining data from 2013-14 (Rojas-García et al., 2018).

Hospitals are environments with illness and infections, and patients may be affected by weakened immune systems. When a patient's hospital stay is extended, the patient is at increased risk of developing nosocomial infections, and increased immobility increases the risk of developing pressure sores (Lim et al., 2006). With immobility, patients lose muscle tone and deconditioning occurs. This is a significant hazard for the older patient population as a loss of conditioning can impact discharge abilities and location, and risk worsening mobility and impaired ability to tend to their activities of daily living (Rojas-García et al., 2018), ultimately resulting in a worsening quality of life. During a period of hospitalisation older adults may have a 30-55% decline in functional status in terms of ability to attend to activities of daily living, and 65% ambulatory function (Kortebein et al., 2008). In association with increased immobility, this also increases the risk of development of a deep vein thrombosis (Lim et al., 2006).

The impact of outlying may worsen the impact of an extended length of stay which in isolation is a financial cost to the health care provider for the cost of a bed and additional nights care but also places the patient at increased risk of developing additional complications. Overall extended stay will have a financial burden to the hospital and emotional burden to the patient and their family (Hassan, Tuckman, Patrick, Kountz, & Kohn, 2010).

4.4.2 Re-presentation and admission cost to provider and patient

On occasion, a patient may be discharged but fail to thrive once discharged home and re-present to hospital, with the possible need for readmission. Some hospitals and health care providers are now recognising the important significance of patients re-presenting for possible admission and are publishing data regarding readmission rates as a quality indicator (Wick et al., 2011). The cost of readmission varies across speciality and patient type.

Emergency departments are noting an increase in presentations which is leading to departments needing to work to strategise to manage these increases. There are documented rises in presentation rates in the United Kingdom, Australia and New Zealand (Blay et al., 2012; Ministry of Health, 2016; National Audit Office, 2018). When a person re-presents to hospital within 30 days from discharge, this may represent a failure of the care provided throughout the hospital stay, and/or to early discharge without appropriate services in place (National Audit Office, 2013). Which readmissions are due to a potential failure of care sustained to outliers is an essential aspect of further research to consider, due to the risk of an outlier presenting to hospital earlier than a patient treated on their intended ward (Francesco et al., 2015; Liu et al., 2014; Stowell et al., 2013; Stylianou et al., 2017).

In the United States, the estimated cost of \$17.4 billion is due to 19.5% readmission of Medicare beneficiaries who were discharged. The implications do not stop at financial cost to the hospital, it also adds increased strain to staff and stretched resources due to unplanned return to hospital. Every failed discharge returning for treatment decreases the availability of a bed and treatment processes to another patient who requires care (Kassin et al., 2012). Reducing readmission will impact on the availability of hospital budgets. However, readmission cost also goes beyond financial cost as it impacts on the patient and their family, by causing a determinantal impact on patient quality of life (Kassin et al., 2012).

Francesco et al. (2015) identified the highest readmission risk within outliers was observed in patients discharged from the geriatric service rather than medicine. They identified this could be in relation to the potential increased clinical frailty of elderly patients within the geriatric service. Older patients are more likely to have increased

comorbidities which are likely to complicate treatment and management plans (National Audit Office, 2013), therefore highlighting the necessity for clear treatment plans. Older and sicker patients are a cohort now shown to be becoming more prominent within healthcare. If older patients who are sicker with complex conditions are outlied, this could result in an increased risk of additional complications and readmission rates. The cost of these complications affects both the patient, family and the healthcare provider. For the patient, there is lost work time, therefore, impacting wider society, psychological and emotional harm and suffering from an extended period of stay with the potential for costly diagnostic tests and drugs (Hassan et al., 2010). This is also a cost to the provider paying for tests and medications with increased resource use than originally predicted within the original treatment plan (Hassan et al., 2010). This highlights the importance of clear treatment plans for all patients who are outliers.

4.5 Measures relating to outlying

The following points discuss items which became apparent during the integrative review process as measures relating to outlying. They can be used to further explore the process of outlying and understand the systemic wide effect of outlying.

4.5.1 Charlson comorbidity scores

Within three studies, one part of the analysis was to calculate a Charlson Comorbidity Index (Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014). The Charlson comorbidity index is a validated tool used “as a measure of one-year mortality risk and burden of disease” (Roffman, Buchanan, & Allison, 2016, p. 171). The index takes account of a person’s age and their comorbidities to attempt to reduce the confounding impact of comorbidities, to predict patient outcome and mortality. Comorbidities are given a numerical value and weighted from one to six for disease severity and mortality risk to create a cumulative score. This score can aid health professionals in placing patients into groups according to their risk and provide targeted effective health care (Roffman et al., 2016).

Each of the three studies that discussed outliers having higher Charlson comorbidity scores indicated a potentially sicker cohort than their corresponding inlier group

(Perimal-Lewis et al., 2016; Perimal-Lewis et al., 2013; Santamaria et al., 2014). The higher the number of comorbidities and higher Charlson comorbidity index score could be an indicator of increased risk to the patient if outlied. This raises concern around what type of patient is safe to outlie in an increasingly ageing and complex health care system. To decrease the patient risk careful consideration of the patient to outlie, and to what secondary department or unit must be undertaken. A question surrounding the practice of outlying should encompass what constitutes a stable patient for outlying and whether there are adequate processes and policies in place to facilitate safe outlying.

4.5.2 Risk analysis of outlying

Other studies have investigated the practice of outlying focusing on processes, rather than patient outcomes. Lepage et al. (2009), completed a prospective risk analysis of the process of care provided for outlying patients using a failure modes, effects and critical analysis (FEMCA) design. They were able to identify 41 failure modes relating to the process of care for outlying patients. These were ranked post calculation by how often the occurrence, severity and detection scores.

The top identified priority failures were reported as a lack of skilled staff to provide appropriate care, and the difficulty conveying information to patients, their families, nurses, and medical staff. This finding directly correlates to those within this review regarding the complexity of caring for patients across varying specialities, and the impact that has on effective communication. Lepage et al. (2009) made several recommendations which included: the identification of specialist doctors, identification of nurse coordinators and the use of standardised medical records.

4.5.3 Swiss cheese model relation to outlying

The practice of outlying has also been correlated to James Reason's metaphor of Swiss cheese, with outlying having the potential for multiple systemic failures which when aligned, may result in patient harm (Goulding et al., 2012, 2015). The Swiss cheese metaphor has become a familiar aid to explain system failures by identifying the weaknesses within a system. When these are identified they are referred to as the 'holes' within the cheese, as these weaknesses can be inconsistent and occurring at variable times. It is when all the holes align that there is increased risk of harm to

individuals within the system (Perneger, 2005). A number of factors were identified as holes within the practice and system of outlying and were discussed by Goulding et al. (2012, 2015) as contributing to systemic gaps. These gaps comprise aspects of the three themes identified within this review as potential factors to influence the outcome of outlied patients and can be grouped into five potential systemic failures: staff and task factors, team factors and workloads, physical environment, equipment and supplies and communication system failures. When these system holes line up, they can negatively influence the care, treatment and outcome of the outlied patient (Goulding et al., 2012, 2015).

4.6 Study design limitation

Retrospective cohort was a common study design used to investigate the practice of outlying. This allowed the collation of large masses of data and patient information, as it was based on historical data already present from hospital data systems. However, the use of retrospective data has limitations which are essential to consider. Access to the data is reliant upon computer systems being available, accessed and managed appropriately to track patient movements within hospitals. If this data was incorrectly inserted by staff, it may create inaccurate data for analysis. Whenever a researcher is using data not initially intended for the research purpose, there may be barriers to overcome to adapt data for their use. They must ensure the data they have received is representative of the population being assessed and be aware of the limitations of making inferences from that data. However, the benefit in using retrospective data is it is cost effective, as data collection can be a time consuming and costly task (Polit & Beck, 2012). Considering the number of patient records however that were able to be examined by retrospective design gives strength to the included studies.

4.7 Chapter summary

This chapter has explored the impact of outlying in relation to current literature and grounded it into the current healthcare environment. It has examined what impact outlying has had on the various areas of health care and explored how the developing practice of specialisation in health care has also influenced outlier potential patient outcomes.

A number of tools and frameworks are able to be related to outlying including the use of Charlson comorbidity scores to assess a patient's risk of outlying. Additionally, the Swiss cheese model is a representation of what can occur to patients when outlied, if all the systematic gaps align to create detrimental outcomes.

Unfortunately, in the author's opinion outlying is a practice not likely to change soon given the current constraints on the health dollar. Despite measures put in place, there may not always be a bed available on the correct unit for the correct patient resulting in outlying. Therefore, if the process of outlying is to occur there should be recommendations on how to facilitate outlying with processes to protect patient safety.

Chapter Five: Recommendations and dissertation conclusion

5.1 Introduction

The practice of outlying patients from their intended wards and treating team has the potential to negatively impact patients and increase costs to the healthcare facility. Practice recommendations have been developed from the synthesis process relating to each of the identified themes, from the included study's authors discussions surrounding outlying based on their individual findings, and the wider reading which supported the development of the dissertation. All the supporting data, themes and developed knowledge on the subject of outlying was combined to produce the four recommended practice changes to decrease the risk associated with outlying. Future research is also recommended as there still is a dearth of research in regard to the practice of outlying. With the advancing patient age, rate of presentations and admissions with associated bed capacity concerns, there is more reason to engage in research to provide safe and effective care when making practice decisions around outlying.

Table 5.1 Practice recommendations

Recommendations		Strategies
1	Ensure stability of the outlied patient	Use early warning scores to assess potential risk
		Assess infection risk
		Evaluate the need for palliative care
		Consider if complex multidisciplinary team discharge planning is needed
		Consider presence of confusion/dementia/delirium
		Consider if receiving highly specialised treatment
2	Medical reviews first	Review outliers prior to inliers to allow early detection of concerns or facilitate early discharge.

3	Designating peer wards	Identify peer wards to have pre-planned acceptance of outliers to allow increased education to staff to increase knowledge, confidence and team familiarity. Pre-planned speciality of outlier will facilitate having required equipment and medications across peer wards.
4	Effective team communication and team identification	Identification of dedicated nurse coordinator who is aware of outlied patients. Documentation of treating team with contact details to enable team communication.

5.2 Recommendation one: Fit to outlie - ensure stability of the outlied patient

Due to the inherent risk associated with outlying, the most appropriate patient should be selected to outlie. Therefore, when deciding to outlie a patient, the first consideration should encompass the stability and appropriateness of the patient. This can be a difficult status to characterise as all patients can have the potential to deteriorate and have complex management processes. Therefore, to ensure only appropriate patients are outlied, guidelines should be created by clinical policy experts to clarify what constitutes a stable patient and whom is most suitable to outlie.

One potential way to categorise patients could be through the use of the Charlson comorbidity index, as this produces a validated measure of mortality risk and disease burden accounting for age and comorbidities as a numerical value (Roffman et al., 2016). If the tool was applied to all patients admitted, it could be one source of information to gauge the risk of outlying a patient with high disease burden and mortality risk. Providing a clear numerical sound reason to protect a patient from outlying, and ensure they are cared for in the correct environment with the correct team. However, in itself, the Charlson comorbidity index scoring system is not likely enough to encompass all the aspects which contribute to the patient risk of outlying. The National Health System (NHS) in the United Kingdom has extensive policies in place regarding bed movement and patient flow, including aspects of how to facilitate

outlying. Across four NHS policies available (Bulman, 2016; Kenny, Woolfall, McMeeking, Cooper, & Wilkinson, 2017; Mid Essex Hospital Services: NHS Trust, 2014; West Suffolk NHS, 2016), several aspects are discussed which classify whether a patient should or should not be outlied. These include: acceptable observation early warning score, low infection risk, if receiving palliative care, complex multidisciplinary team input and discharge planning required, presence of confusion/ dementia/ delirium, or needing highly specialised treatment. They also declare that when moderate to high-risk patients are intended to be outlied it requires the input from a registrar and/or consultant, with clear treatment plans in place (Bulman, 2016; Kenny et al., 2017; Mid Essex Hospital Services: NHS Trust, 2014; West Suffolk NHS, 2016) These patient characteristics encompass aspects which can determine the stability of the patient and the safety of treating the patient off the intended ward to prevent unintended consequences.

5.2.1.1 Use early warning scores

Early warning scores are now commonly used in hospitals and are calculated based on patient vital sign observations, and used to predict and pre-empt patient deterioration, as research has shown patient deterioration is often preceded by a period of altered vital signs (Gerry et al., 2017). The New Zealand Early Warning Score (EWS) vital sign chart was developed for use as a standardised national vital sign chart tested across numerous sites before implementation (Health Quality and Safety Commission New Zealand, 2017). A similar scoring tool is used within the NHS classifying it as NEWS, the National Early Warning Score (Royal College of Physicians, 2017). This should serve as a red flag when selecting a patient to outlie. A patient should have nil or low observation warning score to aid decreasing the risk of the patient deteriorating off their intended home ward, away from their intended treating specialists. If outlied from their home ward with a rising warning score, a clear and documented treatment plan should be in place with appropriate contact details of the treating team in case of patient deterioration.

5.2.1.2 Assess infection risk

Patients with a confirmed risk of infection should avoid unnecessary bed moves as increased bed movement alone increases the risk of spreading infection within hospitals (Blay, Roche, Duffield, & Xu, 2017). Unnecessarily moving a patient with an identified

infection risk without a clinical reason, further exacerbates that risk to the patient, other health care users and providers and the healthcare facility. Therefore, bed movement of outlier patients who are deemed an infection risk should be minimised throughout facilities to decrease risk to themselves and others.

5.2.1.3 Evaluate the need for palliative care

Palliative care patients receive care and intervention to optimise the quality of life and end of life care in what may be a traumatic and emotional time for the patient and their family. They may be receiving specialised multi-professional care from teams trained to assess and manage symptoms to allow the patient to live comfortably, and when they are passing to die with dignity as pain-free as possible (Higginson & Evans, 2010). Consequently, the decision to outlie should be treated with caution considering life expectancy, level of care and specialist input required, with emotional consideration to the patient and family.

5.2.1.4 Complex multidisciplinary team discharge planning

Some patients may have detailed plans which are required to be put in place to facilitate discharge. Discharge planning is an essential aspect of patient care to prepare the patient for transfer home, and bridge the gap between hospital and community care (Katikireddi & Cloud, 2009). This involves a complex process of assessment, planning, education, and evaluation through multidisciplinary collaboration of health professionals. Effective multidisciplinary discharge planning results in improved patient outcomes, can reduce unnecessary readmission, reduce post-discharge complications, and increase patient and family satisfaction (Bauer, Fitzgerald, Haesler, & Manfrin, 2009). Consideration should include whether having the patient outlied would complicate discharge planning with the intended multidisciplinary team, which could result in an increased length of stay with associated potential complications. The patient should be considered unfit for outlying, and instead a patient who is clearly near fit for discharge with planning already completed selected.

5.2.1.5 Confusion/ dementia/ delirium

In the older adult population, there is a documented increased risk of developing confusion or delirium with hospital admissions (Kukreja, Günther, & Popp, 2015). Environmental changes for elder adults increases the risk of falls and development of

delirium with associated risk of injury and increased mortality (McMurdo & Witham, 2013). Furthermore, moving patients from their own environment to hospital can present the first challenge in treating those with dementia. A patient with dementia who requires acute admission which entails moving from their home environment to hospital, within an unfamiliar environment, furthermore increases the risk of short-term mortality (Sampson, Leurent, Blanchard, Jones, & King, 2013). Therefore, bed moves should be considered based on clinical reasoning to the patient to maintain clinical safety, instead of from the perspective of bed management processes to prevent either worsening dementia symptoms or prevent the development of confusion or delirium.

5.2.1.6 Highly specialised treatment

Patients who are receiving highly specialised treatment should not be considered for outlying due to the likelihood of additional skills and equipment required to care for that class of patient safely. Examples can include patients requiring cardiac or respiratory support, invasive monitoring following emergency surgery in unstable patients needing close monitoring for complications, or complex drug administration to maintain haemodynamic stability (Kenny et al., 2017). Each hospital needs to define aspects of patient care and wards which would classify as specialised treatment and adapt local policy to reflect the hospital environment to prevent the outlying of specialised patients.

5.3 Recommendation two: Medical reviews first

Potential failure of care was an identified risk associated with outlying relating to delayed contact with medical teams and assessments. Outlying is associated with bed capacity concerns resulting in patients sent off their intended unit. Outlied patients can often be reviewed at the end of a round making facilitating treatment and discharge plans complicated (Goulding et al., 2012, 2015). Outlying itself poses a risk to the patient, thereby to attempt to reduce this risk consideration could be that outlied patients are reviewed first, allowing time for detection of any complications and to communicate concerns. If the patient is well and preparing for discharge, this would also facilitate quick assessment, planning for tests which can be confirmed early, and if within acceptable ranges preparations for discharge can begin. The implementation of such processes may aid in the resolution and prevention of ongoing bed blocking, and

capacity management concerns, as patients who are outlied are promptly discharged early in the day if applicable, freeing beds for additional patients.

5.4 Recommendation three: Designating peer wards

A concern identified has been the lack of communication, knowledge and equipment available to staff when a patient is outlied. In larger hospitals with multiple specialties and differences, there can still be similarities found across ward areas. For example, the similarity across surgical wards versus the difference in cares from surgical to medical. The identification of wards which manage a similar level of patient acuity, medications, physiology and treatment, could aid in reducing the significant variation which has occurred with medical specialisation.

As it appears outlying is inevitable the identification of similar wards who have pre-planned acceptance of outliers from another area of the hospital could reduce the risk to patients. The staff could become more familiar if a consistent type of patient is outlied to them, and they would also have the potential to become familiar with the outlied treating team to develop therapeutic relationships. Directed education could be provided towards the intended outliers to that area, thereby increasing staff knowledge and confidence to treat outlied patients. Being prepared for a specific medical specialisation of an outlier could also precipitate the anticipation of additional equipment and medications which is required on the ward, decreasing any potential treatment or medication delays when an outlier is sent to an additional ward.

5.5 Recommendation four: Effective team communication and team identification.

Communication was an essential aspect identified as a system failure when outlying a patient, the treating team was not geographically near or known to the treating outlying staff, and therefore influenced the treating staff not knowing who to contact for patient advice (Goulding et al., 2012). Therefore, effective communication strategies should be in place to facilitate safe outlying practices, which can include the identification of a dedicated nurse coordinator who is aware of outlied patients, and clear documentation of the intended treating medical team and plan.

An identified nurse coordinator should be available and aware of the outlied patient, their status, conditions and required treatment. This coordinator can ensure communication to the relevant medical team to ensure the patient is reviewed in a timely and appropriate manner. The identified nurse should also be available and staff on other wards aware that they can be utilised as a point of contact if required for questions or concerns when staff are not familiar with the treatment of the outlier patient. This contact person should be identified before outlying occurs.

The treating team should also be documented for easy identification with contact details to facilitate communication when there are questions or concerns regarding the outlied patients or the need for a medical review. These documents should have the inclusion of clear treatment plans set prior to outlying patients. This would include identification and documentation of the nurse coordinator and medical teams, with methods of contact placed in the patient's file. This document can be used as an alert to all staff involved in the patient care that the patient is being treated as an outlier to ensure proper processes are followed, even when they are treated off their intended home ward (Appendix E).

5.6 Future research

Despite the practice of outlying becoming common, it still appears to be an area in which research and development is lacking. Despite the appearance of an inherent risk associated with the practice of outlying, there is still an absence of clear, indisputable research to unequivocally state the practice of outlying patients is a vulnerability of hospital bed management systems. There is some research with the advancement of specialised units such as stroke units, and the treatment of patients only on those units, but this now needs further investigation as the field of medicine and treatment becomes more specialised in response to the world's ageing population. In contrast to the past (with people who present for treatment having one condition), healthcare today is more complicated with multimorbidity, with interacting and associated chronic conditions, which make treatment of one condition on one specialty complex and more intricate due to associated comorbidities. Therefore, research must consider what impact outlying will have on those who have more multifaceted management protocol and complications than in the past.

5.7 Conclusion of dissertation

Outlying is a bed management process unlikely to cease in practice within the current constraints of world healthcare. Provision of healthcare services can be costly, and that cost and need for beds to treat patients may only increase with an increasingly ageing population, with multiple health concerns. The need for treatment beds is at a premium, but those beds are becoming more and more specialised between wards as medical science advances. With competition for suitable beds, the correct bed is not always available on the correct unit, with the correct staff, for the correct patient. As a result, the patient is treated away from the intended team.

This dissertation has attempted to answer the question whether the practice of outlying as a strategy to bed crisis puts patients at risk throughout their treatment, compared with those patients who are treated as inliers with the intended medical and treating teams. The three main themes which became apparent from the synthesised data and wider reading, identifies that there is an inherent risk to patients and healthcare providers due to the practice of outlying. The building aspects of these themes coincidentally have adverse findings similar to what has been developed as quality indicators of hospital care including: unplanned readmissions, higher mortality rates and unexpected long length of stay. In addition, outlying has potential to result in delays in care, increase the risk of experiencing a complication or emergency, impacts effective team communication to support patient safety, and can influence the confidence staff have to care for those who are not from their speciality area, whom they are not familiar with treating.

There is a degree of argument amongst the included studies in regard to evidence, with not all evidence inconclusively showing data of patient harm from every included study. However, any evidence which shows potential harm which could come to patients because of this practice should be considered a risk, and therefore, treated with seriousness to ensure hospitals are maintaining patient safety and the practice of outlying is not resulting in detrimental patient outcomes. Therefore, the practice of outlying precipitates risks to the patient, and healthcare providers need to work with adequate plans and strategies to minimise those risks.

Recommendations for practice changes were discussed to encompass four proposals including: ensuring only stable patients are sent off ward by ensuring they are fit to outlie. Outliers having medical reviews first for expedient review of concerns or discharge home. Identifying wards which are similar and prepared to accept outliers to be designated as peer wards, thereby allowing the development of expanded practice and knowledge through targeted staff training. Finally, ensuring there is effective team communication to encourage patients whom are outlied to have developed strategies and documentation in place to prevent the inherent risks which come with the practice of outlying. Finally, future research was recommended to encompass the changing population trends of patients who are potentially older, with more complex conditions and comorbidities.

Healthcare is forever evolving and changing, and with change, there are benefits and risks. To keep up to date with change, healthcare providers need to be proactive in identifying risks, and challenging practice to keep evolving with healthcare transformations. Challenging the practice of outlying is just one component of healthcare which can be questioned to provide a safe, efficient, and well-running healthcare service, with the best interest of patient's outcomes at the centre of focus.

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Appendix A: Quality assessment tables for included articles with associated JBI quality assessment tool (Joanna Briggs Institute, 2017a)

Key: Y - yes N - no N/A - not applicable U - unclear

Cohort studies quality assessment.

Question	Alameda & Suarez, (2009).	Bai et al., (2018).	Perimal-Lewis et al., (2013).	Perimal-Lewis et al., (2016).	Santamaria et al., (2014).	Stowell et al., (2013).	Stylianou et al., (2017).
1	Y	Y	Y	Y	Y	Y	Y
2	Y	Y	Y	Y	Y	Y	Y
3	Y	Y	Y	Y	Y	Y	Y
4	Y	Y	Y	Y	Y	Y	Y
5	Y	Y	Y	Y	Y	N	Y
6	Y	Y	Y	Y	Y	Y	Y
7	Y	Y	Y	Y	Y	Y	Y
8	N/A	Y	Y	N/A	Y	Y	Y
9	N/A	Y	Y	N/A	N/A	U	N/A
10	N/A	N/A	N/A	N/A	N/A	N	N/A
11	Y	Y	Y	Y	Y	Y	Y
Score	8/8 100%	10/10 100%	10/10 100%	8/8 100%	9/9 100%	8/11 72%	9/9 100%

JBI Critical Appraisal Checklist for Cohort Studies

Reviewer _____ Date _____

Author _____ Year _____ Record Number _____

	Yes	No	Unclear	Not applicable
1. Were the two groups similar and recruited from the same population?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the exposures measured similarly to assign people to both exposed and unexposed groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Was the exposure measured in a valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were confounding factors identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were strategies to deal with confounding factors stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes measured in a valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Was the follow up time reported and sufficient to be long enough for outcomes to occur?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Were strategies to address incomplete follow up utilized?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

Quasi-experimental studies (non-randomised experimental studies) quality assessment.

Question	Hommel et al., (2008).
1	Y
2	Y
3	Y
4	Y
5	Y
6	Y
7	Y
8	Y
9	Y
Score	9/9 100%

JBI Critical Appraisal Checklist for Quasi-Experimental Studies (non-randomized experimental studies)

Reviewer _____ Date _____

Author _____ Year _____ Record Number _____

	Yes	No	Unclear	Not applicable
1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the participants included in any comparisons similar?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Was there a control group?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes of participants included in any comparisons measured in the same way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

Qualitative research quality assessment.

Question	Goulding et al., (2012).	Goulding et al., 2015
1	Y	Y
2	Y	Y
3	Y	Y
4	Y	Y
5	Y	Y
6	N	N
7	Y	N
8	Y	Y
9	Y	Y
10	Y	Y
Score	9/10 90%	8/10 80%

JBI Critical Appraisal Checklist for Qualitative Research

Reviewer _____ Date _____

	Author _____	Year _____	Record Number _____			
			Yes	No	Unclear	Not applicable
1.	Is there congruity between the stated philosophical perspective and the research methodology?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Is there congruity between the research methodology and the research question or objectives?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Is there congruity between the research methodology and the methods used to collect data?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Is there congruity between the research methodology and the representation and analysis of data?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Is there congruity between the research methodology and the interpretation of results?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Is there a statement locating the researcher culturally or theoretically?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Is the influence of the researcher on the research, and vice-versa, addressed?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Are participants, and their voices, adequately represented?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

Case series quality assessment.

Question	Francesco et al., (2015).
1	Y
2	Y
3	Y
4	Y
5	Y
6	N
7	Y
8	Y
9	Y
10	Y
Score	9/10 90%



JBI Critical Appraisal Checklist for Case Series

Reviewer _____ Date _____

Author _____ Year _____ Record Number _____

	Yes	No	Unclear	Not applicable
1. Were there clear criteria for inclusion in the case series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Was the condition measured in a standard, reliable way for all participants included in the case series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were valid methods used for identification of the condition for all participants included in the case series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Did the case series have consecutive inclusion of participants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Did the case series have complete inclusion of participants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was there clear reporting of the demographics of the participants in the study?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Was there clear reporting of clinical information of the participants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were the outcomes or follow up results of cases clearly reported?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was there clear reporting of the presenting site(s)/clinic(s) demographic information?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Was statistical analysis appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

Control studies quality assessment.

Question	Liu et al., (2014).
1	Y
2	Y
3	Y
4	Y
5	Y
6	N
7	Y
8	Y
9	N/A
10	Y
Score	9/9 100%



JBI Critical Appraisal Checklist for Case Control Studies

Reviewer _____ Date _____

Author _____ Year _____ Record Number _____

	Yes	No	Unclear	Not applicable
1. Were the groups comparable other than the presence of disease in cases or the absence of disease in controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were cases and controls matched appropriately?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were the same criteria used for identification of cases and controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Was exposure measured in a standard, valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Was exposure measured in the same way for cases and controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were confounding factors identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were strategies to deal with confounding factors stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes assessed in a standard, valid and reliable way for cases and controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was the exposure period of interest long enough to be meaningful?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

Appendix B: JBI data extraction form (Joanna Briggs Institute,
2014a)

**JBI QARI Data Extraction Form for Interpretive
& Critical Research**

Reviewer Date

Author Year

Journal Record Number

Study Description

Methodology
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Method
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Phenomena of interest
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Setting
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Geographical
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.....

Cultural
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Participants
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.....

Data analysis
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.....

Authors Conclusions
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.....

Comments
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.....

Complete Yes No

Appendix C: Example blank table developed for data extraction

Article	Details
Phenomena of Interest	
Setting	
Geographical	
Methodology & Method	
Participants	
Data Collection	
Data Analysis	
Results/ Findings	
Authors comments	
Reviewers comments	
Level of Evidence	
Credibility	

Appendix D: Data extraction tables

Article	Alameda, C., & Suárez, C. (2009). Clinical outcomes in medical outliers admitted to hospital with heart failure. <i>European Journal of Internal Medicine</i> , 20(8), 764-767. doi:10.1016/j.ejim.2009.09.010
Phenomena of Interest	<p>Impact of outlying patients with the All Patients Diagnosis-Related Group (AP-DRG) 544 (congestive heart failure and cardiac arrhythmia with major complications or comorbidity) who are sent to other departments different from the Internal Medicine ward.</p> <p>Outcomes included – length of stay (LOS), readmission with the same DRG in the next 30 days, mortality and intra-hospital morbidity.</p> <p>Intrahospital infection (urinary, respiratory, bacteraemia, or others beginning 48h after admission).</p> <p>Intrahospital haemorrhage (digestive, urinary or others).</p> <p>Intra-hospital venous thromboembolism (deep vein thrombosis or pulmonary embolism).</p>
Setting	La Princesa University Hospital a public university hospital, with 500 beds. Study focusing on Department of Internal Medicine.
Geographical	Madrid, Spain.
Methodology & Method	<p>Retrospective cohort study.</p> <p>Discharge summaries and records retrospectively analysed to investigate the impact of outlying.</p> <p>Patients were classified as a medical outlier if they were admitted to a ward other than the Internal Medicine ward.</p>
Participants	<p>Patients discharged from Department of Internal Medicine with the All Patients Diagnosis-Related Group (AP-DRG) 544.</p> <p>Total 243 patients met inclusion criteria.</p> <p>109 (45%) patients were treated as outliers.</p>

	Mean age (years): medical outliers 82.4, non-medical outliers 82.0.
Data collection	Data collected from minimum basic data set (MBDS).
Data analysis	LOS – Mann-Whitney U test. Pearson’s chi-square test to analyse other outcomes. Multivariate analysis with multiple regression for LOS, logistic regression for other primary outcomes. Carried out with SPSS 13.0 for Windows.
Results/ Findings	Patients admitted to Internal Medicine department with AP-DRG 544 had a shorter stay in hospital if they were admitted to the department ward compared if they were sent to other wards (p.766). Medical outliers had longer hospital stays (11.8 vs 9.2 days, difference 2.6 days, p = 0.001), but no significant difference in mortality, intra-hospital morbidity or readmission was observed (persisted after control for confounding) (p.765). Statistically significant difference in secondary outcomes was not observed (p. 765). Significantly different distribution in “admission at the weekend or bank holiday” that was more frequent in the medical outlier’s cohort (34% v 22%; p=0.045) (p.765).
Authors comments	Additional analysis for LOS found no significant differences in the patient's studied from outlier cohort, not sicker to explain for longer LOS. Increases in LOS may be a result of worse management of hospital resources versus care received Including: Outliers often visited at end of the shift, after inliers visited, resulting less time available to spend with outliers. More difficulty tracking patient progress as off ward, nursing processes have already occurred such as laboratory requests and ward secretaries are finished, so some administrative procedures may be delayed (p. 765). Clinicians are under less pressure to discharge a patient who is not in the department ward resulting longer hospitalisation (p. 765). Potential for nursing staff not as familiar with treatments, and workload of patients from Internal Medicine department, lack of experience hinders noticing minor changes in patient conditions (p. 766).

	<p>Being near medical staff allows nurse to be more efficient, they can readily talk about minimal, non-life-threatening changes that occur in patients allowing treatment adjustment (p. 766).</p> <p>Recommend further study is required.</p>
Reviewers comments	Limited due to small study population and only one patient group examined (AP-DRG 544), authors acknowledge this could be addressed by a larger patient population. Reduced threat to internal validity but limits external validity. A frequently referenced study throughout the outlier literature.
Level of Evidence	Level 3c
Credibility	Credible

Article	Bai, A. D., Srivastava, S., Tomlinson, G. A., Smith, C. A., Bell, C. M., & Gill, S. S. (2018). Mortality of hospitalised internal medicine patients bedspaced to non-internal medicine inpatient units: retrospective cohort study. <i>BMJ Quality and Safety</i> , 27(1), 11-20. doi:10.1136/bmjqs-2017-006925
Phenomena of Interest	To evaluate the relationship between outlied General Internal Medicine (GIM) patients and in-hospital mortality. Length of stay (LOS). Readmissions to the same hospital within 30 days for those patients who were discharged alive.
Setting	Tertiary level, acute-care, university-affiliated teaching hospital with large catchment area exceeding 500,000 people. 440 inpatient beds, more than 22,000 inpatients every year. GIM service with 68 beds for four Clinical Teaching Unit (CTU) teams.
Geographical	Canada.
Methodology & Method	Retrospective cohort examining patients admitted from the Emergency Department (ED), patients were admitted under CTU team to GIM ward, where GIM ward bed capacity reached, a bed is secured off service on another medical subspecialty or surgical ward, and the patient is outlied. CTU team remained responsible for all patients assigned on and off ward, whereas allied health and nursing care was provided by off-service ward. Data collected on: patient demographics, admission diagnosis, comorbidities, death in hospital, details of discharge from hospital, room location. Patients followed until death in hospital, discharge, or up to 365 days (whichever was first).
Participants	Included consecutive adult patients admitted to the four GIM CTU teams from 1 January 2015 to 1 January 2016. 4935 patients admitted under GIM service, 3243 included in the analysis, of those one third 35% (1125) were outlied. Median age: outlied patients – 71 (57-80), assigned GIM ward patients (inliers) – 72 (59-82).
Data collection	Data collected during 2015 from patient electronic medical records and discharge abstract database – an administrative database collected for all hospital discharges.
Data Analysis	Cox proportional hazards model to assess in-hospital mortality.

	<p>Competing risk models, propensity score matching and pair matching.</p> <p>Sub-distribution HR (Shr) calculated based on Fine and Gray model</p> <p>Proportional hazards were tested based on weighted Schoenfeld residuals for Cox proportional hazards and competing risk models.</p> <p>Sensitivity analyses propensity score for room allocation was estimated using multivariable logistic regression model.</p> <p>Outlied patients were matched to a GIM patients 1:1 ratio so each matched pair was admitted in the same rotation block, under the same CTU team to reflect workload. Covariate balance between two groups was assessed by standardised difference.</p> <p>Groups were compared with Cox proportional hazards and competing risk models.</p> <p>P <0.05 statistical significant level.</p> <p>All analyses done with R V.3.2.3</p>
Results/ findings	<p>The risk for in-hospital mortality among outlied patients was approximately three times higher than those admitted to their assigned wards in the first week of admission, the relationship between outlying and death was time dependent, and then decreased by week three to similar risk. The result was consistent across multiple analyses (p 16).</p>
Authors comments	<p>Potential reasons for outlied patients' higher risk of mortality:</p> <ul style="list-style-type: none"> • Off-service wards geographically separated from usual rounding areas, potential to decrease frequency and duration of patient contact. • Reduced frequency and quality of communication between the wards outlied allied health team and nurses, and the CTU medical teams, inadequate conversation is a known risk factor for higher inpatient mortality. • Lack of participation in ward 'bullet rounds' where patients discussed by medical and allied health Monday – Friday to update care plans and discuss patient care, thereby promoting an interdisciplinary approach. Outlied patients miss this as they are not included. • Potential lower quality of care by unfamiliar allied health team members who have different skills and lack experience in caring for outlied patients.

	<ul style="list-style-type: none"> GIM patients are often outlied at the start of admission, potential to be more acutely unwell in the first days and requiring high workload and intervention. Less frequent monitoring due to geographical distance barriers at vulnerable time may increase risk of adverse outcomes (p, 18).
Reviewers comments	Well planned, clearly describes study and definition of outlied patient. Large sample size supported by multiple levels of analysis including propensity score matching and pair matchings. Sample over one-year period allowing adjustment for seasonal variation. Very recent study published 2018, providing up to date literature.
Level of Evidence	Level 3c
Credibility	Credible

Article	Francesco, S., Giuseppe, F., Roberto, B., Onofrio, L., Anna, A., & Fabio, P. (2015). Outlier admissions of medical patients: Prognostic implications of outlying patients. The experience of the Hospital of Mestre. <i>Italian Journal of Medicine</i> , 9(3), 299-302. doi:10.4081/itjm.2015.528
Phenomena of Interest	To learn more about the prognosis of outlying patients. Compared patients: mean hospital length of stay, survival and early readmission according to outlying status.
Setting	Hospital in Mestre supplying 465 beds for adults, 239 for medical (84 internal medicine, 35 geriatrics, remaining speciality branches), 226 for surgical specialities. The emergency department links all metropolitan emergencies with mean daily presentations of 218 patients.
Geographical	Mestre, Northern Italy population of 250,000 inhabitants.
Methodology & Method	Case Control. Total number of admissions, patient gender, age, degree of dependence, mortality, length of stay, outlying location (medical vs surgical), Diagnosis Related Group (DRG) at discharge, and readmission within 90 days were examined, related to outlying status. Outlying status defined as patients admitted in beds outside of medicine or geriatrics.
Participants	In 2012, 2833 patients admitted to Internal Medicine, and 995 to Geriatrics, in total investigated 3828 consecutive patients hospitalised. Patient demographics not listed.
Data collection	Method of data collection not disclosed.
Data Analysis	Multivariate model analysis to estimate association between variables and outlying status.
Results/ Findings	No differences discovered between outlying and non-outlying for gender, age, and diagnosis at discharge (p. 300). The risk of being hospitalised as an outlier was twice as high for patients assigned to geriatrics than to medicine (p. 300). Respiratory diseases were less likely hospitalised as outliers (p. 300). Percentage of readmission within 90 days was higher for outlying, compared to home ward patients for geriatrics and

	<p>medicine (p. 300).</p> <p>Post adjustment, risk of death was twice higher for outlying patients admitted into surgical compared with medical (p. 300).</p> <p>Risk of death was greater for patients with cardiovascular and gastroenterological DRG (p. 300).</p>
<p>Authors comments</p>	<p>The increased risk to outliers into surgical areas could be related to health staff being less familiar with emergency/urgency procedures of frail medical patients (p. 301).</p> <p>Risk of readmission majority seen in patients discharged from geriatrics than medicine, underlying the increased clinical frailty of very old patients (p. 301).</p> <p><u>Critical issues and consequences of hospitalisation as an outlier identified and discussed:</u></p> <ol style="list-style-type: none"> 1. Physician: late visits after inlier patients and being assessed by multiple physicians. Consequence: increased LOS, lacking a reference physician and limited confidence in health facilities. 2. Nurse: therapies, tests and procedures unfamiliar to nurses of outlied patients, surgical wards less experienced in managing acutely unwell medical patients and health equipment. Limited knowledge of disease processes, and discharge information to patients incomplete. Consequence: delay in diagnosis and increase in LOS. Increase risk mortality and morbidity. Patient and caregiver dissatisfaction, increased risk of early hospital readmission after discharge. 3. Work Organisation: increased distance of outlied patients from physicians assigned to their care. Frail patients discharge poorly considered. <p>Discomfort in daily practice:</p> <ul style="list-style-type: none"> • Finding patients, medical and therapy records. • Beginning and changing treatments. • Obtaining information. • Obtaining appropriate assistance when required. <p>Consequence: delay in emergency/urgency intervention, increasing morbidity and mortality. Lack of cooperation between</p>

	<p>physician and nurse, increasing clinical risk error, increasing LOS. Increased risk of early hospital readmission. (p.301).</p> <p>Ways to reduce need to outlie by reducing bed demands by: managing patients through community facilities, provide more services which usually occur in hospital in the community, accelerate discharges, use of short-stay units, allocate patients in beds of medical department designed for intensity of cares rather than specialities, use of a case manager for discharges difficult patients (p. 301).</p>
Reviewers comments	Does not provide patient demographics or source of data, brief description of study only provided but does provide data for investigated outcomes.
Level of Evidence	Level 3d
Credibility	Credible

Article	Goulding, L., Adamson, J., Watt, I., & Wright, J. (2012). Patient safety in patients who occupy beds on clinically inappropriate wards: A qualitative interview study with NHS staff. <i>BMJ Quality and Safety</i> , 21(3), 218-224. doi:10.1136/bmjqs-2011-000280
Phenomena of Interest	To explore National Health Service (NHS) staff members experience and perception of safety issues faced by patients who are placed on clinically inappropriate wards or outlying.
Setting	NHS hospital with approximately 1100 inpatient beds.
Geographical	Single large NHS foundation trust in the North of England.
Methodology & Method	Qualitative phenomenology with semi-structured interviews. After literature review and five pilot interviews, a semi-structured interview guide was developed.
Participants	29 interviews completed, recruited purposively to ensure multiple specialities and professions covered between January and July 2010, eight men, 21 women. Eight medical staff (registrars and consultants). 13 nursing staff (sisters, staff nurses and healthcare assistants). Eight non-clinical staff (bed managers, patient service managers and a general manager). Across multiple specialities: medicine (6), surgery (2), care of the elderly (2), orthopaedics (4), head and neck (4), plastics (3), gynaecology (5).
Data collection	Interviews took place between January and July 2010 individually at the hospital. Participants were asked about the process of bed allocation, type of patients who may be moved, what safety issues are faced, what causes of safety concerns may be. Interviews between 20 minutes and one hour with the average lasting 45 minutes
Data Analysis	Transcribed verbatim, qualitative data management program ATLAS.ti 5.0 used with thematic approach and constant comparison.

	<p>Interviews transcribed.</p> <p>Coding and theme development undertaken.</p> <p>Data collection and analysis cyclical.</p>
<p>Results/ Findings</p>	<p>Report that NHS staff believe that outlying of patients is a patient safety concern.</p> <p>Five key contributory factors underlying patient safety:</p> <ul style="list-style-type: none"> • Competing demands on staff time created by having patients on inappropriate wards and patients on the correct speciality ward. <ul style="list-style-type: none"> ○ Difficulty in caring for patients of competing specialties may impact patient safety and compromise care. Suggested difficult to care when patient groups have broadly different needs. For example, heavily dependent medical patients, on surgical ward needing toileting or supervision due to wandering, distracting staff from regular post-operative observations. Delay in medical reviews as often seen after the home ward patients, may overall increase length of stay. With delayed review, important diagnoses may be missed therefore risking deterioration (p. 220). • Poor communication between specialty ward and clinically inappropriate ward. <ul style="list-style-type: none"> ○ Less ability for ‘informal’ communication with medical team when patient is outlied verses when on correct speciality, treating team are familiar with each other and in close proximity for conversation. Lack of familiarity may result in difficulties communicating and deterioration for outlied patients’ staff. Communication breakdown may result in patients being ‘forgotten about’. Nursing staff at times do not know who to contact for discussing patient conditions (p. 220). • Lack of knowledge or specialist expertise on clinically inappropriate wards. <ul style="list-style-type: none"> ○ Due to the high specialisation of nursing care, nurses may have insufficient knowledge or expertise to provide care of those from other specialities. Staff may be unfamiliar with differing medications, resulting in medication rounds being more difficult to complete and potentially increase the risk of errors or omissions. The unfamiliarity of patient condition or potential worsening symptoms could potentially result not recognising early deterioration. If outlied patients are presumed more well, they can be reviewed by junior doctors who may not have skills to determine correct diagnosis or

	<p>recognise deterioration (p. 221.).</p> <ul style="list-style-type: none"> • Unsuitable ward environment. <ul style="list-style-type: none"> ○ The distance between home and outlied wards often prohibitive for medical staff. Lack of necessary equipment for outlied patients. Unavailability of medication as may not be stock drug in outlied ward results in time delay to the patient getting medication or being missed therefore potentially delaying patients' management. Ensuring proper placement of infective patients if outlying patients with methicillin-resistant staphylococcus aureus to surgical wards increasing risk to surgical patients (p. 222). • Characteristics of patients placed on inappropriate wards (perceived low priority and potential for disorientation). <ul style="list-style-type: none"> ○ Suggestion that outlied patients receive 'second service' as they are assumed to be the most medically stable and fit patients. Movement of confused patients perceived inappropriate as it may create further disorientation and increased risk of falls (p. 222).
<p>Authors comments</p>	<p>That the study identifies that NHS staff have concerns regarding patient safety when outlied due to the above contributory factors. These factors are easily linked to frameworks which are designed to investigate and analyse patient safety incidents such as the London Protocol and human factors framework. The identified contributory factors are all known and been associated with patient safety concerns in healthcare.</p> <p>Contributory factors from the London Protocol includes:</p> <ul style="list-style-type: none"> • Team factors (communication and team structure). • Staff factors (knowledge, skills and competence). • Work environment factors (workload, skill mix, availability of equipment and the physical environment itself). • Patient factors (complexity and seriousness of patients' conditions, communication, personality, and social factors). <p>(p.223).</p> <p>Discussed application of Reason's Swiss cheese model of accident causation may expose patients to factors which underlie adverse events. In the Reason's Swiss cheese model of accident causation, factors such as the ones identified can cause 'holes in the defences' of patients and increase their risk of adverse events. Therefore, placement of a patient on a</p>

	<p>clinically inappropriate ward presents a latent threat to patient safety and quality of care.</p> <p>Author recommendations included:</p> <ul style="list-style-type: none"> • Redesign of ward rounds, so outlied patients are seen promptly. • Strategies to facilitate communication between staff. • Additional training for nursing staff from other specialities. • Ensure processes are in place to prevent inappropriate patient being outlied. <p>(p. 223).</p>
Reviewers comments	<p>Clear representation of participants experience supported well throughout the direct quotes for theme development. Wide range of NHS staff interviewed providing input from all team members. Thorough explanation of steps taken for design, interview and developing themes process.</p>
Level of Evidence	<p>Level three</p>
Credibility	<p>Credible</p>

Article	Goulding, L., Adamson, J., Watt, I., & Wright, J. (2015). Lost in hospital: A qualitative interview study that explores the perceptions of NHS inpatients who spent time on clinically inappropriate hospital wards. <i>Health Expectations</i> , 18(5), 982-994. doi:10.1111/hex.12071
Phenomena of Interest	To explore patient's perspective of the quality and safety of care received during inpatient stay on clinically inappropriate bed or outlined versus the correct specialty ward.
Setting	Single large NHS teaching hospital.
Geographical	North of England.
Methodology & Method	Qualitative phenomenology with semi-structured interviews. Interviews occurred between January and April 2011 in participants homes within 10 days of discharge from hospital. Topic guide was constructed following extensive literature review.
Participants	Purposive sampling. Nineteen participants who spent time on at least one clinically inappropriate ward (18 had spent time on the correct speciality ward, six had been inpatients regularly in the preceding year). Medical specialities of patient: medical, geriatric, orthopaedic and geriatric, ENT and pain management, surgical, orthopaedic, urology, vascular. Inappropriate ward specialities: orthopaedic, gynaecology, ENT, orthopaedic, plastics. Age range: 20-29 (n-2); 30-39 (n-1); 40-49 (n-3); 50-59 (n-2); 60-69 (n-4); 70-79 (n-2); 80-89 (n-5).
Data collection	In interviews participants were asked about the wards they stayed on, the difference between the wards, transfers between wards, the nursing and medical input received, and feelings regarding being placed in an outlying ward. Interviews between 20-80 minutes averaging 45 minutes.

Data Analysis	<p>Interviews transcribed verbatim, coding and theme development.</p> <p>Qualitative data management software ATLAS.ti.5.0 used to facilitate analysis.</p> <p>Thematic approach with principles of constant comparison, begun once the first few interviews transcribed. Line by line coding and iterative process was used to categorise data to develop key themes and subthemes.</p>
Results/Findings	<p>Four key themes identified</p> <ol style="list-style-type: none"> 1) Patient feelings. <ol style="list-style-type: none"> a. Divide in overall opinion about being placed on a clinically inappropriate ward. <p>Many accepted need to be outlied, acknowledging prioritisation of resources with beds needed for sicker admissions, however, they still might have preferred to be on the correct ward. Feelings of desire for continuity of care on correct ward and need of ‘belonging’ on correct ward (p. 985).</p> b. Belonging. <p>Feeling of an outsider on outlied ward, beliefs they were prioritised beneath patients of the intended ward. Feeling segregated from those with similar conditions, no shared belonging on outlied ward (p. 985).</p> c. Feelings surrounding ward transfers. <p>Some participants encountered issues with ward transfers, some occurring between wards very late at night or early morning causing upset. Dislike of moving numerous times, preferring treatment on as few wards as possible. Transfers removed patients from developing friendships they had made on wards. One participant expressed increased risk with her rapid transfer as she was infectious and then required to come back to proper ward for isolation (p. 986).</p> 2) Staff availability, knowledge and expertise. <ol style="list-style-type: none"> a. Staff input – feeling forgotten on clinically inappropriate wards. <p>Many satisfied with nursing input across all wards, identified nursing staff excessively busy on both wards. Some participants suggested input from medical team was compromised when outlied. Unable to access medication until a nursing staff member able to get medical staff to visit outlied</p>

ward to prescribe. Lack of continuity of care due to seeing multiple doctors no regularity or being outlied and not seeing medical for review for a few days (often weekends). Participants felt 'forgotten' creating increased anxiety (p. 986).

b. Nurses knowledge compromised?

Participants reported some nurses were familiar with their condition and them, however, others indicated care at times was compromised with unfamiliarity with specialised nursing care relating to outlied patients, poor understanding of impaired mobility or minor mistakes were made whilst delivering nursing care (p. 987).

c. Patients feel 'in safe hands'.

Two participants suggested they were unsure they had been in safe hands whilst outlied due to a lack of specialist staff input and expertise. Some who reported feeling safe related to this by discussing faith in hospital staff to relay concerns. Noted by authors that participants who reported feeling in 'safe hands' also provided accounts of potentially unsafe care (p. 988).

3) Communication.

a. Lack of information given.

Reason for outlying often reported by participants as ill-explained and they would have liked a full explanation of reason for moving, more detail of the intended outlied ward they were moved, and information on potential implications this may have on ongoing care.

Participants became concerned with medical reviews when they were not as frequent, and communication could have aided allaying their worries if the reason had been explained.

Reported by several participants, it was harder to get information regarding their condition and care while outlied.

When discharged from outlying ward increased unawareness of aftercare requirements, and unsure who to contact for advice following discharge (p.989).

4) Resources.

a. Resources available

	<p>Suggestion that not all equipment or medications were readily available on outlied ward. Participants reported delays in medication due to delays in getting prescriptions, ordering and delivery if medication not in stock for outlied ward (p. 990).</p>
<p>Author's Comments</p>	<p>Author discusses Reason's Swiss cheese model of accident causation to suggest that patient safety issues are often underpinned by underlying (latent) conditions in the environment, patients exposed to several factors which could impact safety.</p> <p>Several raised by participants in this study included:</p> <ul style="list-style-type: none"> • Staff factors (nursing staff lacking knowledge). • Team factors (reduced input from multidisciplinary teams). • Task factors (nurses unfamiliar with aspects of care to outlied patients). • Physical environment (outlied patients geographically located from home team). • Staff workload (staff input reduced when patients on inappropriate wards). • Equipment and supplies (medication or equipment may be unavailable on outlied ward). • Communication systems (information and communication may be compromised). <p>(p. 991).</p> <p>These number of contributory factors suggests that placement of patient on an inappropriate ward presents a latent threat to patients' safety.</p> <p>Actions to mitigate safety may include:</p> <ul style="list-style-type: none"> • Ensuring regular medical review of outlied patients. • Clear explanation of patients of rationale for ward movement and implications on their care • Confirming medication and necessary equipment are available on the outlied ward prior to transfer. <p>(p. 991).</p>

Reviewer's Comments	Investigating outlying from perspective of patient to establish their view on the process of outlying, potential impact and their view on safety. Provides clear evidence with direct quotes from participants interviews. Wide range of ages and ward areas interviewed for inclusive data.
Level of Evidence	Level 3
Credibility	Credible

Article	Hommel, A., Bjorkelund, K. B., Thorngren, K., & Ulander, K. (2008). Differences in complications and length of stay between patients with a hip fracture treated in an orthopaedic department and patients treated in other hospital departments. <i>Journal of Orthopaedic Nursing</i> , 12(1), 13-25. doi:10.1016/j.joon.2007.11.001
Phenomena of Interest	Comparisons made between patients admitted with a hip fracture treated in orthopaedic department and those at other departments not specialising with orthopaedics, including comparison of a new clinical pathway in all groups.
Setting	Lund University Hospital.
Geographical	Sweden.
Methodology & Method	<p>Quasi-experimental.</p> <p>Study completed during April 1st, 2003 and March 31st, 2004.</p> <p>On October 1st, 2003 evidence-based clinical pathway introduced (transition period patients admitted not included to prevent confounding).</p> <p>On each ward (orthopaedic and non-orthopaedic), control group followed clinical pathway prior to intervention. Intervention group followed the new evidence-based pathway.</p>
Participants	<p>Total participants 478 consecutively included.</p> <p>273 patients with a hip fracture treated at an orthopaedic department with 147 patients with hip fracture admitted to other departments due to bed shortages.</p> <p>No significant difference between patient characteristics at admission and treated in both wards, or between control and intervention group.</p> <p>Age (years).</p> <p>Control group: orthopaedic department 81.8; other (outlier) department 80.8.</p> <p>Intervention group: orthopaedic department 80.1; other (outlier) department 80.8</p>

Data collection	<p>Two doctoral students collected data from medical records, interviewed patients, and/or next of kin and were available 24 hours a day, seven days a week during the study period.</p> <p>Within 30 minutes of emergency department admission, Short Portable Mental State Questionnaire for normal mental functioning (SPMSQ) completed and demographic data collected, with another collection form for complications.</p> <p>Patients followed up after four and 12 months with a home visit.</p>
Data Analysis	<p>Baseline characteristics and complications compared with standard statistical methods.</p> <p>Non-parametric data tested with Pearson chi-square test and where appropriate Fisher's exact test.</p> <p>Student's <i>T</i>-Test used for parametric data.</p> <p>Level of significance set at $p < 0.05$.</p> <p>Analyses completed using Statistical package for Social Sciences version 14.0 for Windows.</p>
Results/ findings	<p>Patients treated in wards not specialised in orthopaedics experienced increased complications before discharge, prolonged length of stay in acute hospital care (LOS), prolonged LOS in rehabilitation units (p. 22).</p> <ul style="list-style-type: none"> • Within 24 hours 60% patients treated in orthopaedic department were operated on compared to only 48% in other departments (p 18). • Administrative delay was noted in 33% in orthopaedic department, 40% outliers. Potentially related to prolonged waiting time in ED before finding an appropriate admission bed, and not placing patients on orthopaedic wards with staff familiar with organising care for patients with hip fractures (p. 18). • In intervention group significant difference ($p < 0.02$) in patients experiencing complications between treated in orthopaedic department (48.7%) vs others (60.5%) (p.18). • More patients treated in non-orthopaedic departments affected by cardiac failure (4.8% vs 10.2%, $p, 0.04$) and urinary tract infection (19.8 % vs 28.6%, $p 0.05$), (noted in intervention group), (p. 18). • In this study, when patients either from the beginning are admitted to an inappropriate ward not specialised in orthopaedic care or a few days after surgery transferred from the orthopaedic wards to other wards, LOS was increased in both the acute hospital care and in rehabilitation units. The difference was LOS of 3.7 days in acute

	<p>hospital setting and LOS of 13.6 days in rehabilitation (p. 23.).</p> <ul style="list-style-type: none"> • Patients on non-orthopaedic wards were not mobilised as effectively as those on orthopaedic wards. Suggested this could be due to fear or doing something wrong as personal not familiar with orthopaedic care (p. 23). • At 12 months no statistical differences in complication or LOS between patients on orthopaedic and non-orthopaedic department (p. 18). • Patients with a trochanteric fracture 63.5% associated with complication in non-orthopaedic ward vs 58.8% in orthopaedic ward (p. 21).
Authors comments	<p>More patients treated in non-orthopaedic departments experienced complications, discussed that result could be due to outlied patients being sicker, however, the data collected suggests that they were not. Or that there were different processes in the care provided to the patients treated in different departments. Delay in mobilisation due to fear of causing injury by incorrect movement, catheters meant to be removed day one, however, patients in other departments tended to have catheter for additional days (p.23).</p> <p>Recommend when patients are sent to non-orthopaedic department with a hip fracture, they are treated in departments with a geriatrician physician, together with physiotherapist, occupational therapists and nurses specialising in orthopaedics taking an active part in patient care (p. 23).</p>
Reviewers comments	<p>Complex study due to multiple assessments and areas of interest throughout. Comparing control and intervention for new orthopaedic strategy and outcomes of care. Whilst also comparing those groups across intended wards (orthopaedic) and not intended (non-orthopaedic) with support of orthopaedic team. Creates a complex study to analyse.</p>
Level of Evidence	<p>Level 2.c</p>
Credibility	<p>Credible</p>

Article	Liu, J., Griesman, J., Nisenbaum, R., & Bell, C. (2014). Quality of care of hospitalised internal medicine patients bedspaced to non-internal medicine inpatient units. <i>PLoS One</i> , 9(9), 1-9. doi:10.1371/journal.pone.0106763
Phenomena of Interest	To examine if quality of care differs between outlied and non-outlied patients. Primary outcomes assessed - estimated length of stay (ELOS). ELOS is a computerised estimated value which reflects the expected length of hospitalisation adjusted for age, medical comorbidities, diagnosis and in-hospital resources intensity weights. Secondary - readmission rates within 30 days of discharge. Ten quality measures were evaluated to assess thoroughness of care for their appropriate diagnosis
Setting	St Michael's Hospital a tertiary-care 513-bed teaching hospital affiliated with University of Toronto. General Internal Medicine (GIM) has 64 beds comprised of four clinical teams.
Geographical	Toronto, Canada.
Methodology & Method	Matched cohort design with consecutive admissions. Retrospective chart review – each exposed outlied patient was matched to with an unexposed patient. Admitted with same diagnosis, during same call shift, and same physician.
Participants	Of 1639 consecutive admissions 39 matched pairs were compared, three groups comprising: congestive heart failure (24), chronic obstructive pulmonary disease (15), and pneumonia (12). Mean age: GIM ward 66.9, outlied 68.4. Outlied location: surgical ward 30.8%; subspecialty medicine ward 53.8%; mixed surgical/ subspecialty medicine ward 12.8%; remained in emergency department 2.6%.
Data collection	Hospital database used to identify consecutive GIM admissions for congestive heart failure, chronic obstructive pulmonary disease, and pneumonia from May 2007 to March 2011.

Data Analysis	<p>For binary outcomes – estimated matched risk ratios (RR). Mantel-Haenszel methods implemented.</p> <p>If matching was broken and pairs were incomplete (rare occurrence), unmatched RR were estimated. If outcomes were not binary, application of clinically relevant proportion to both groups was applied.</p> <p>Wilcoxon signed-rank test for ELOS and percent ELOS.</p>
Results/ findings	<p>Outlied patients had a similar length of hospital stay compared with general internal medicine ward patients (4.9 vs 6.0), (p. 4).</p> <p>Mean calculated ELOS for outlied patients was 6.6 days compared with 7.0 for general internal medicine patients (p. 4).</p> <p>20.5% outlied versus 30.8 % general internal medicine patients represented to the emergency department within 30 days. Median times showed outlied patients returned to the emergency department within 6.5 days post discharge compared to 8.0 if discharged from general internal medicine. (p. 4).</p> <p>Groups had similar adherence to both general and disease-specific processes of care measures (p. 6).</p>
Authors comments	<p>Outlying was unrelated to length of stay including when corrected for diagnosis and medical comorbidities (p.6).</p> <p>Not able to find evidence there was poorer adherence to quality of care indicators if outlied, however, authors hypothesise the small sample size may cause limited statistical power, and frequency of ordering the indicators was so low in both groups further analysis was precluded, could have benefited from increased sample size (p.7).</p> <p>50% of study patients admitted on the weekend, fewer medical staff available for patient care and discharge planning resulting fewer discharges from general internal medicine service, therefore increasing the need to outlie patients (p.80).</p> <p>Identifies research gap and recommend further research, and increased hospital awareness (p. 8).</p>
Reviews comments	<p>Matching process is a strength of the study, and ensuring patients cared on GIM and outlied are across same physician, diagnosis, however, small sample size may have limited available results.</p>

Level of Evidence	Level 4c
Credibility	Credible

Article	Perimal-Lewis, L., Bradley, C., Hakendorf, P. H., Whitehead, C., Heuzenroeder, L., & Crotty, M. (2016). The relationship between in-hospital location and outcomes of care in patients diagnosed with dementia and/or delirium diagnoses: Analysis of patient journey. <i>BMC Geriatrics</i> , 16(1), 190-212. doi:10.1186/s12877-016-0372-5
Phenomena of Interest	Comparison of patients who had dementia and/or delirium according to the proportion of time spent on their home ward versus as outliers.
Setting	Flinders Medical Centre (FMC), 500-bed public teaching hospital with 40,000 ED presentations per annum.
Geographical	South Australia.
Methodology & Method	Retrospective descriptive study. Hospital emergency department presentations from 1/01/2007 – 22/09/2014 with dementia and/or delirium diagnoses based on ICD-10-AM as principal diagnosis and/or included of the 24 additional diagnoses had data extracted. Inpatient data extracted retrospectively and linked to FMC patient journey database to extract information on ward movements.
Participants	Those admitted to FMC coded with dementia and/or delirium diagnoses based on the International Classification of Diseases (ICD-10-AM) for 2007-2014. Inpatient spent $\geq 70\%$ of hospital stays outside home ward were classified as an outlier. Final patient population used 6367. Mean age: inlier 80.83, outlier 82.39.
Data collection	From the Flinders Medical Centre emergency department database.
Data Analysis	Descriptive statistical analyse of patient demographics. Categorical variables compared using Chi-squared tests. Continuous variables compared using Wilcoxon-Mann-Whitney tests. Logistic regression models to analyse risk factors and health system outcomes (assessed using Hosmer and Lemeshow's goodness-of-fit test).

	<p>p value <0.05 considered statistically significant.</p> <p>Charlson comorbidity index calculated for all patients.</p> <p>Sensitivity analysis to assess impact of different definition of dependent variable to assess robustness of results.</p>
<p>Results/ Findings</p>	<ul style="list-style-type: none"> • Outlier patients were likely to be triaged under Australasian triage scale (ATS) 5 category. An ATS 5 category patient are considered to be less urgent and clinical outcome are considered not to be significantly affected if treatment is delayed for up to two hours (p. 6). • Outlier patients more likely to have higher Charlson comorbidity index indicating patients are sicker cohort (p6.). • Emergency department LOS for outlier higher than inlier, 3.9 hours longer than inlier (average LOS 5.5 hours), remained higher than inliers regardless of seasonal variation (p. 6). • Emergency department LOS was higher on weekends than weekdays for outliers (p.7). • Outlier inpatients LOS was 5.6 days less than inlier, after adjustment for independent variables outlier patients were more likely to stay at hospital a shorter duration when compared to inlier (p. 7). • Outlier were at higher risk to die in hospital within 48h of admission, showing inferior health system outcomes for outlier patients (p. 7). • Outliers more likely at risk of not receiving their discharge summaries within two days of discharge from hospital, posing concerns for continuity of care (p. 8). • Higher proportion of outlier patient (17.6%), than inlier (8.3%) were transferred to another hospital to continue care. Outlier patients more likely to be transferred to another hospital to continue care, for example, rehabilitation or palliative care (p. 8).
<p>Authors comments</p>	<p>That the location of care of a patient with dementia and/or delirium diagnosis during an episode of inpatient care at a tertiary hospital can affect their health system outcomes with inferior care for outlier patients.</p> <p>ATS 5 category more likely to be assigned to outlier, their inability to provide information during admission may cause increased likeliness of undertriage for cognitively impaired patients. Outlier patients are more likely to have higher Charlson comorbidity index indicating they are a sicker cohort of patients. The combination of outliers being sicker and their treatment priority in the emergency department categorised as less urgent naturally contribute to prolonged</p>

	<p>emergency department LOS (p. 9).</p> <p>Adjusted inpatient LOS for outlier patients was shorter than inlier. However, researchers comment that similar to previous findings they do not equate a shorter LOS with improved quality of care for outlier patients; there is no difference in readmission rates, or hospital mortality rate. The risk and readmission and timely dissemination of discharge summaries reflects quality of care (p. 10).</p> <p>For the entire cohort, about 70% of deaths within 48 hours of admission occurred in the outlier group. The higher mortality may reflect the system of care provided but also that the patients were more acutely unwell, this raises cause for concern if data reflects admitting patients initially to outlier wards as common occurrence (p. 10).</p> <p>As outliers discharge summaries were less likely to be completed, and with being clinically complex patients more likely transferred to another hospital to continue care outside of Flinders Medical Centre, raises making timely completion of discharge summaries a critical point (p.10).</p>
Reviewers comments	Discusses clear identification of outlier being patient spent more than 70% stay off ward, attempted analysis at 100% did not allow for full statistical assessment. Reflects actual hospital stay that patients do not generally get to spend their entire time on a home ward as is difficult to achieve in hospitals, therefore shows realistic data from patients who spend time both on and off ward. Clear identification of dependent variable and independent which may contribute to confounding.
Level of Evidence	Level 3c
Credibility	Credible

Article	Perimal-Lewis, L., Li, J. Y., Hakendorf, P. H., Ben-Tovim, D. I., Qin, S., & Thompson, C. H. (2013). Relationship between in-hospital location and outcomes of care in patients of a large general medical service. <i>Internal Medicine Journal</i> , 43(6), 712-716. doi:10.1111/imj.12066
Phenomena of Interest	Examine the status of a patient as a ward inlier or outlier, and measures of outcomes during and after admission. Assessed patient's length of stay (LOS), risk of in-hospital deaths, risk of readmission or death within four weeks of discharge relative to proportion of time spent in their home ward.
Setting	General medical service with 100 inpatient beds out of 500 at the Flinders Medical Centre, caring for patients with complex multisystem pathology.
Geographical	South Australia.
Methodology & Method	Retrospective observational. Data collected to examine all hospital inpatient stays for patients admitted and discharged by the General Medicine (GM) service. Patients assigned inlier or outlier by computerised bed management system using instant updated information pertaining to allocated home wards.
Participants	Initial extract of 23,439 records after exclusion criteria implemented. Excluded those whose admission more than 30 days as a discharge delay is often due to administrative concerns or finding placement which may confound potential differences in LOS therefore excluded. Post exclusion left with 19,923 patients, 15,213 as inliers, 2592 were outliers, 2118 did not meet either category. Mean age (years): >70% outlier hours 69.7, >70% inlier hours 72.7.
Data collection	Data from Flinders Medical Centre patient journey database was extracted. Data was also collected on patients age, time spent in emergency department awaiting a bed to compute comorbidity index. Data extracted 1 January 2003 to 20 September 2009. Births, deaths and marriage register accessed to identify patients who died within 28 days of discharge.

Data Analysis	<p>Statistical analysis used STATA 12.2.</p> <p>Poisson regression analysis to adjust LOS, mortality and readmission data for inpatient age.</p> <p>Charlson comorbidity index.</p>
Results/ Findings	<p>Risk of readmission within one week or 28 days was substantially lower in outlier group (p. 714).</p> <p>Discharge summaries were delayed and less likely to be completed in outlier population (p. 714). Likelihood of discharge summaries completion within two days lower for outlier (outlier 40.7% versus inlier 61.2%) (p. 715).</p> <p>Diagnosis-related group-based mean predicted LOS for inlier and outlier groups were similar (5.98 patient days and 5.72 days) (p. 714).</p> <p>Post adjustment for patients age, Charlson index, gender, and length of time spent waiting for a bed in ED, outliers were at significantly higher predictor risk of increased in-hospital mortality (4.5% versus s 3.5%), and within 48 hours of admission (50.4% vs 22.4%), and reduced LOS (total in hospital LOS hours SD 113.3 vs 139.3) (p.714).</p> <p>Risk of readmission within seven days was not significantly affected by outlier status (p. 714).</p> <p>Reduction in risk of readmission for outliers within 28 days (p. 714).</p>
Authors comments	<p>That this study demonstrates over the study period that the location of care of a general medicine patient in the hospital carried implication separate to the complexity of their illness and their age (p. 715).</p> <p>LOS was shorter, but they do not equate decreased LOS with improved quality of patient care, instead comparing readmission within a week which was also not compromised. Risk of readmission within 28 days was lower for outlying patient.</p> <p>The reduced LOS was unexpected and continued despite exclusion of patient whose LOS were likely non-clinical reasons. One day difference between predicted and actual LOS in outlier suggested outlier ward location affected LOS irrespective of the principal diagnosis (p. 715).</p> <p>An increase of over 40% in mortality risk in those who were outliers and were more likely to die within 48 hours of admission (p 715).</p> <p>Post controlling for confounders analysis confirmed outlier status remained a significant predictor of both increased</p>

	<p>inpatient death and reduced LOS (p. 715).</p> <p>Delayed discharge summaries can result in delayed communication between the in-hospital medical team and community clinicians (p. 716).</p>
Reviewers comments	Strength of study completed over long time frame (six years), leading to significant data capture, with large patient population.
Level of Evidence	Level 3c
Credibility	Credible

Article	Santamaria, J. D., Smith, R. J., Anstey, M. H., Tobin, A. E., & Reid, D. A. (2014). Do outlier inpatients experience more emergency calls in hospital? An observational cohort study. <i>The Medical Journal of Australia</i> , 200(1), 45-48. doi:10.5694/mja12.11680
Phenomena of Interest	The number of emergency calls per hospital admission with consideration of their location within the hospital, home ward versus time spent outlying.
Setting	St Vincent's Hospital, 400-bed university-affiliated tertiary referral hospital.
Geographical	Melbourne, Australia.
Methodology & Method	Observational cohort. Home wards were designated as either general medical or surgical. Data was collected for the number of medical emergency team (MET) calls and where the patient was located for the MET call.
Participants	All patients admitted between 1 July 2009 and 30 November 2011 were eligible – total 58,158 admissions, 11,034 spend time as outliers. Mean age (years): non-outlier 60.8, outlier 64.0.
Data collection	Data obtained from hospital's patient master index which includes data on all admitted patients and lists all bed movements for each admission.
Data Analysis	Compared continuous variables using Mann-Whitney <i>U</i> test. Categorical variables – Fisher exact or χ^2 test. Adjusted for confounding variables – modelled data using zero-inflated negative binomial regression. High-risk clinical units included in multivariate analysis including variables found to be statistically significant. Data analysed with Stata version 12 (StataCorp). P value set at $P < 0.05$.

**Results/
Findings**

- Patients spending time outside their home wards were: older, had longer hospital stays, greater severity of illness (by Charlson comorbidity index), higher mortality and more complications (p. 46).

	Non-outlier	Outlier
Age	60.8 (44.0–73.5)	64.0 (44.3-78.0)
LOS in days median (IQR)	0.85 (0.13-3.33)	4.17 (2.0-8.59)
Predicted 10-year mortality, median (using Charlson comorbidity index) (IQR)	10% (2-22%)	22% (2-47%)
In hospital mortality	528 (1.12%)	284 (2.5%)
Number of complications:		
0	38967 (82.69%)	7771 (70.43%)
1-10	7742 (16.43%)	3093 (28.03%)
11-20	366 (0.78%)	147 (1.33%)
21-30	44 (0.09%)	18 (0.16%)
31-40	5 (0.01%)	5 (0.05%)

Outlier patients were more likely to be general medical or neurosurgical patients (p. 46).

- Patients who spent some period as outlier were more likely to have an emergency call versus those who were not (3.8% vs 1.5%), (p.47).

	<ul style="list-style-type: none"> • Outlier group 87% of calls occurred while patient was away from home ward and outlier group were more likely to have cardiac arrest (p. 47). • After adjustment (high-risk clinical units, age, same-day admission, 10-year predicted mortality, inter-hospital transfer), outlying from home ward was associated with a 53% increase in emergency calls (p. 47).
Authors comments	<p>That patients treated outside their home ward had more comorbidities, more emergency calls, and worse hospital outcomes (mortality and complications) than those who remained on their home ward (p.47).</p> <p>Deterioration may be result of a patient's clinical condition and severity of disease (and therefore not preventable or expected), however, in some cases, it may result from failure of the primary team to recognise and manage a worsening clinical situation.</p> <p>Maybe due to:</p> <ul style="list-style-type: none"> Lack of expertise of nursing staff when caring for patients with unusual conditions (e.g. heart failure patients on surgical wards). Delayed calling of medical staff or no available medical staff in the immediate environment (p.47). <p>There is evidence that treatment offering specialised treatment on home wards may improve outcomes such as care provided by stroke management teams, authors state that: this study supports this hypothesis as patients moved outside their home ward, they had more emergency calls worse clinical outcomes (p 47).</p> <p>Recommendations: if patients must be outlied place high-risk complication patients in appropriate location. If required to choose who to outlie select younger patients with same-day admissions as they are less likely to experience a clinical deterioration. Use of short-stay units, liaison services for less well patients and early referral of surgical patients to medical units (p.47).</p>
Reviewers comments	Beneficial as only study to solely investigate the impact of outlying and relate to number of emergency calls. Well referenced within the literature for safety of outlying patients.
Level of Evidence	Level 3c

Credibility	Credible
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Article	Stowell, A., Claret, P.-G., Sebbane, M., Bobbia, X., Boyard, C., Genre Grandpierre, R., ... de La Coussaye, J.-E. (2013). Hospital out-lying through lack of beds and its impact on care and patient outcome. <i>Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine</i> , 21, 17-24. http://doi.org/10.1186/1757-7241-21-17
Phenomena of Interest	To compare the quality of care provided for patients who are outlying in inappropriate wards due to a lack of free beds on the appropriate specialty, compared to the care given to non-outlying patients. Primary objective – measure differences in length of hospital stay (LOS) between outlying and non-outlying inpatients. Secondary objective – assess mortality at 24 hours, 28 days, three months; rate of readmission to hospital at 28 days; rate of transfer into the intensive care unit. To identify reasons why hospitalisation in outlying patients is less efficient.
Setting	University hospital with an annual census of 60,000 patients.
Geographical	In a major town in the South of France with 150,000 citizens.
Methodology & Method	Monocentric prospective study of matched-pair clusters in an exposed/non-exposed cohort. Exposed group examined those hospitalised in either medical or surgical ward as outliers, non-exposed were hospitalised in their intended destination ward. First group included outlying patients after randomisation; second was control group including non-outlying patients. Clusters were paired based on age, sex and reason for admission. Patients in first group (outlying) was matched to a specific control patient from the second group (non-outlying). The care was noted provided from arrival in causality to release, and through to outcomes up to 90 days after hospitalisation.
Participants	552 initially, 69 excluded as untraceable. 483 underwent pairing 238 in non-outlying group, 245 in outlying. No significant differences in groups (age, sex ratio, reasons for admission and biological characteristics). Mean Age (years): non-outlying 76 (58-85), outlying 69 (54-80).
Data Collection	Data was collected two phases. Phase one March to May, data regarding hospitalisation of each patient obtained from care

	<p>tracking software (Clinicom, Siemens Health Services). Medical files gave access to administrative data.</p> <p>Phase two patients included were contacted via phone in July and August 2010 and questioned about mortality at 28 and 90 days and as to any readmission to hospital at 28 days.</p>
Data Analysis	<p>Student test to establish and compare main outcome criteria.</p> <p>Student, chi-square, Fisher exact test and Mann and Whitney tests used to compare parameters in exposed and non-exposed.</p> <p>P values of less than 0.05 were considered to indicate statistical significance.</p>
Results/ Findings	<p><u>Emergency department care</u></p> <ul style="list-style-type: none"> • More patients in the outlying group had their prescriptions completed in the emergency department before transferring to the ward despite the hospital policy to leave the prescription for the home ward clinician. (86% vs 76%) (p.3). • Higher number of low molecular weight heparin (LMWH) prescriptions in the non-outlying group (31% vs 24%) (p. 4). <p><u>Care in wards</u></p> <ul style="list-style-type: none"> • Outlying patients remained in hospital for eight days compared with seven days for non-outlying (p. 4). • 52% of non-outlying patients received heparin-based thromboembolic prevention compared to 42% outlying group (p. 4) <p><u>Clinical outcomes</u></p> <ul style="list-style-type: none"> • 26% of outlying patients were readmitted to hospital within 28 days compared to 17% non-outlying (p. 4).
Authors comments	<p>Observed significant increase in average hospital length of stay in outlying patients, although reasons not able under investigation of the study, authors suggested possibilities include: longer delay between the time of arrival in the outlying ward and first contact with a medical practitioner, insufficient medical contact between the outlying patient and the doctors in the outlying ward, a standard of care that is not as good as a specialist ward would provide, and a lack of knowledge among medical nurses when caring for surgical or traumatology patients (p.4-5).</p>

	<p>Outlying is a risk factor for early readmission (p.5).</p> <p>Regarding emergency department tendency to prescribe more low molecular weight heparin to non-outlying patients could be due to concern of side effects of heparin treatment and less medical monitoring occurring on outlying ward (p. 5).</p> <p>More prescriptions written for outlying patients' reasons could be: possible excess medication upstream due to in situ or telephones advice received by emergency staff or concerns in the outlying ward that they are not giving enough medication (p.6).</p> <p>Authors concluded outlying patients receive a lower standard of care. This exposes patients to increased length of stay, early readmission to hospital and insufficient thromboembolic prevention. Therefore, outlying is a risk (p. 6).</p>
Reviewers comments	Well planned with clear outline of steps to undertake study with patient matching process to ensure similar demographics and reason for admission. Follow up time appropriate to assess any impact outlying at 90 days.
Level of Evidence	Level 3c
Credibility	Credible

Article	Stylianou, N., Fackrell, R., & Vasilakis, C. (2017). Are medical outliers associated with worse patient outcomes? A retrospective study within a regional NHS hospital using routine data. <i>BMJ Open</i> , 7(5), 1-21. doi:10.1136/bmjopen-2016-015676
Phenomena of Interest	To investigate potential associations between medical outliers and patient outcomes. Exploring quality and safety of patient's healthcare. Did being treated as an outlier lead to worse outcomes? Primary outcomes were: <ul style="list-style-type: none"> • In-hospital mortality. • 30-day mortality. • Readmission to the same hospital within 30 days of discharge. • Hospital length of stay (LOS).
Setting	Royal United Hospitals Bath NHS Foundation Trust, a 565-bed hospital.
Geographical	District general hospital in South West England serves population of 550,00 people.
Methodology & Method	Retrospective, cross-sectional observational study. Study period covered three financial years: 2013/2014 – 2015/2016. Medical outlier defined as a hospital inpatient who was classified as a medical patient for an episode within a spell of care and had at least one ward placement on a non-medical ward within that spell. An episode of care was the time a patient spent under the care of one consultant.
Participants	Total extracted records 71,038 patients classified as medical cases. Non-outlying 64,017 (90.12%). Outlying 7021 (9.88%). No significant differences in age, sex, secondary diagnoses and procedure count.

	Mean age: non-outlying 66.18, outlying 68.62.
Data collection	Data extracted from Business Intelligence Unit patient administration system.
Data Analysis	<p>Univariate analysis used to establish relationship between patient outcome when patient was outlier or not.</p> <p>Logistic regression used for readmission and mortality outcomes.</p> <p>Xero-truncated negative binomial regression for LOS.</p> <p>Multivariable methods were used to adjust for possible confounding factors.</p> <p>Statistical significance was measured at p-value of less 0.05.</p> <p>Analyses were performed using Stata V.13.1.</p>
Results/ Findings	<ul style="list-style-type: none"> • On average patient spells had six secondary diagnoses attached to their medical record. Non-outliers had 6.17, and medical outliers had 6.85 with statistically significant ($p = 0.001$) (p. 3). • Primary diagnosis was different between non-medical outliers and medical outliers: <ul style="list-style-type: none"> Non-medical outliers: diseases of the circulatory system, followed by category symptoms and signs and abnormal findings not classified. Medical outliers: diseases of the respiratory system followed by digestive system (p. 3). • Medical outliers were not associated with increased odds of in-hospital or 30-day mortality but do affect the readmission probabilities and was statistically significant. 11% of total readmissions to hospital were patients who were outliers at some point of their care (p. 3.). • Outliers have more than double the LOS of non-medical outlier spells. Outliers were staying in hospital longer, and some had spells recorded more than 30 days in hospital. Calculated as staying in hospital approximately two days longer than non-medical outliers (p. 3).
Authors comments	<p>Outlied patients were generally considered less unwell than those kept on designated wards who are more severely affected by their disease/condition (p. 5).</p> <p>After adjusting for variables, outliers did not have increased odds of in-hospital mortality, 30-day mortality, or</p>

	<p>readmission (p.5).</p> <p>Outlier have double the LOS and confirmed by multivariable analysis (p.5).</p> <p>Outlied patients may experience increased LOS due to difference in primary disease diagnosis or:</p> <ul style="list-style-type: none"> ○ Delayed medical contact between arrival and first examination if immediately placed on outlied ward. ○ Insufficient contact with medical and nursing personnel during the outlied period. ○ Inability of nursing personnel to meet patient needs because of lack of specialisation on the disease /condition of the patient (p. 6). <p>The field of outliers is not extensively researched (p. 6).</p>
Reviewers comments	Strong study design and methodology, well-planned indication of medical outlier regarding medical spells. Examined wide range of diagnoses within patient population. Clear explanation of study design and research steps.
Level of Evidence	Level 4b
Credibility	Credible

Appendix E: Example “this patient is outlying” document

**This patient is being treated as an
outlier**

Please place this in front of patient file

Date outlied:

Intended ward:

Outlied ward:

Home ward nurse coordinator:

Primary treating team and contact numbers

Consultant:

Registrar:

House Officer:

Treatment plan:

Estimated discharge date (if available):