

This is the peer reviewed version of the following article: Blay Nicole, Duffield Christine, and Gallagher Robyn 2012, 'Patient transfers in Australia: implications for nursing workload and patient outcomes', Blackwell, vol. 20, no. 3 Special issue, pp. 302-310.. which has been published in final form at <http://dx.doi.org/10.1111/j.1365-2834.2011.01279.x>. This article may be used for non-commercial purposes in accordance With Wiley Terms and Conditions for self-archiving'

Patient Transfers in Australia: Implications for Nursing Workload and Patient

Outcomes

Abstract

Aim: to discuss the impact of patient transfers on patient outcomes and nursing workload.

Background: many patient transfers are essential and occur in response to patients' clinical changes. However, increasingly within Australia transfers are performed in response to reductions in bed numbers, resulting in 'bed block'.

Evaluation: a discussion of the literature related to inpatient transfers, nursing workload and patient safety.

Key issues: measures to increase patient flow such as short-stay units may result in an increase in patient transfers and nursing workload. Frequent patient transfers may also increase the risk of medication incidents, healthcare-acquired infections and patient falls.

Conclusions: the continuing demand for healthcare has led to a reactionary bed management system which in an attempt to accommodate patients has resulted in increased transfers between wards. This can have a negative effect on nursing workload and impact on patient outcomes.

Implications for nursing management: high nursing workload is cited as one reason for nurses leaving the profession. Reductions in non-essential transfers may reduce nurse workload, improve patient outcomes and enhance continuity of patient care.

Keywords

Patient transfers, Nursing workload, Patient outcomes; Continuity of care

Introduction

In Australia as in other Western nations, the rapidly ageing population combined with increased rates of chronic and complex diseases have increased the demand for health care. This is reflected by an increase in presentations to Australian Emergency Departments (EDs), reductions in hospital length of stay and an increase in hospital separations which in the Australian context refers to the completion of a hospital episode by either discharge, transfer to another facility or death (AIHW 2010 p.351). ED presentations increased by 6.1% from 2004/05 to 2008/09 (AIHW 2010) separations increased on average 3.8% per annum over the same period (AIHW 2010) while acute hospital length of stay has decreased by 16.2% (AIHW 2006, 2010). At the same time the number of hospital beds decreased from 4.03 to 3.88 per 1,000 head of population (AIHW 2010). Financial constraints and staffing shortages often force the closure of wards or beds (Rocker et al. 2003, Capps et al. 2010) on a short or long term basis, further limiting hospital capacity. The number of older persons seeking care in hospital has increased with those aged 55 plus years representing 52.9% of all hospital separations in 2008/09 (AIHW 2010). Access to aged care facilities (e.g. nursing homes) on discharge from the acute setting has also decreased so that in 2006 there were 5% fewer residential aged care beds per head of older population compared to the previous decade (AIHW 2007). Increased hospital presentations combined with a decreased number of beds has led to a phenomenon called access block, defined as the delay in gaining access to a hospital bed (Australasian College for Emergency Medicine 2004). Not surprisingly, demand for health care and reduced availability for beds has led to higher hospital occupancy rates. There are regular reports from Australian hospitals of 95% occupancy despite recommendations from the Australian Medical Association that rates should not exceed 85% (Australian Medical Association 2008). Hospitals have put in place a variety of measures to deal with this situation, many with unintended consequences. For example high hospital occupancy levels are known to increase nursing workload (Weissman et al. 2007) and have been linked to negative patient outcomes (Weissman et al. 2007, Australian Medical Association 2008, Sprivulis et al. 2006)

such as health-care acquired infections (Clements et al. 2008, Cunningham et al. 2006b, Orendi 2008). More recently, high patient turnover and the associated impact on nursing workload has been found to have a negative effect on patient mortality (Needleman et al. 2011).

This article will discuss more fully how organisational strategies designed to improve patient flow have increased the number of patient transfers that are unrelated to clinical need and the implications for nurses' workload and patient outcomes.

{Duffield, 2009 #1195}Patient Flow and Bed Management Strategies

Since the late 1990s hospitals have endeavoured to increase patient flow by implementing a variety of bed management strategies (Taylor et al. 2004) which for the most part remain in operation today. For example, a common strategy is to establish a mental health unit or other short stay areas aimed at promoting patient throughput by segregating, treating and discharging selected patients, usually within 48 hours (Downing et al. 2008). When used appropriately, short stay units avoid the need to transfer patients to other wards in the hospital (Downing et al. 2008). Unless patients are comprehensively assessed and selected for admission to these short stay units (Downing et al. 2008, Basic and Khoo 2009) vacant beds may be viewed as 'general bed stock' (Brand et al. 2010 p.335). Some patients admitted to short-stay areas are not suitable for short stay unit admission as their clinical condition limits the likelihood of their being discharged within the short-term. For example Hartley et al. (2010) found that 27% of patients were inappropriately admitted to the emergency short stay unit and 32% required transfer to a general ward.

A second strategy is that in periods of overflow hospitals are often forced to 'open' additional beds as a temporary measure. Frequently in Australia, this occurs during the winter months, to accommodate an increase in demand from medical patients and the elderly (Lemma and NSW Health 2004). These beds do not relate to a particular specialty but serve to 'capture'

patients unable to be admitted to their specialty ward when beds are full, so as to accommodate new admissions in response to surges in hospital demand (Thompson et al. 2009). Opening of extra beds during peak occupancy periods can have a negative effect on nursing workload and patient mortality. Nurses may be required to care for additional patients when new beds are opened (Schilling et al. 2010) which challenges the principle of continuity of care. These 'outliers' are transferred when a bed in the relevant specialty ward becomes available.

A third strategy has been to nurse patients of both genders in the same room. For example, if the only available bed is in a four bedded room with three males then a female may be admitted to it. The practice has met with strong criticism (Garling 2008) leading to policy directives for hospitals to reinstitute single-gender rooms (NSW Health 2010). A similar directive in the U.K. has met with limited success, as hospitals struggle to cope with patient admissions and limited bed resources (Bryant and Adams 2009). Single-gender rooms offer greater patient privacy, but are likely to increase bed transfers as nurses attempt to accommodate patients of the same gender within the same room, again impacting on their workload. Aligned to this is 'hot-bedding', a derivative of 'hot-bunking' whereby submariners shared bunks due to space limitations (Health & Safety Executive 2008). Rapidly discharging and either admitting or transferring a new patient into the recently vacated bed is a mechanism used by hospitals to augment patient flow (Duffield et al. 2009). Often one patient is in the bed and the other admitted but waiting in a transit lounge or chair in the ward. The midnight census, which is simply a count of all occupied beds at midnight, does not reflect this level of occupancy (Simon et al. 2011, Baernholdt et al. 2010) despite the substantial negative impact on nursing workload (Baernholdt et al. 2010).

The transit lounge is another strategy to minimise use of hospital beds. Similar to the airport transit lounge, these are short-term resting areas for patients prior to hospital admission or while awaiting discharge, although some transit lounges are used as ED short stay areas

(Gilligan et al. 2009, Taylor et al. 2004). Transit lounges rely on the commitment of staff to transfer patients from the ward (Proudlove et al. 2003), are underutilised (Chetter 2009) and have limited effect on improving patient flow (Gilligan et al. 2009).

An unintended consequence of many of these bed management strategies is an increase in patient transfers between beds and wards. Decades ago 23% of patient transfers were described as unnecessary (Deines and Stevens 1987). It is likely this figure is much higher today. While patients are regularly transferred between units, wards and departments as a routine part of their episode of care for treatment or diagnostic purposes, the frequency of patient transfers has increased within Australia and other Western countries over the past three decades. Six hospital trusts in the U.K. indicated that on average, almost 9% of patient admissions per month were transferred for 'non-clinical' reasons (West 2010) while in France 15% of patients experienced ward transfers (Eveillard et al. 2001) and in the U.S.A. 79% of patients were nursed in two to five units (Kanak et al. 2008). Transfer rates are extremely variable. For instance, U.K. hospital trusts demonstrated that monthly inpatient transfer rates for surgical patients ranged from a low of 9% to a high of 88% independent of diagnosis, hospital and method of data collection (West 2010). Australian data indicate that medical/surgical patients were nursed on an average of 2.26 wards during an average hospital stay of 4 days (Duffield et al. 2007). Considering these figures, it is not surprising that governing bodies in Ireland have begun to describe the frequency of patient moves as 'excessive' (DHSSPS 2005 p28) and are now questioning the impact of transfers on patient outcomes (RQIA 2008).

It must be acknowledged that as health care has become more technological and sophisticated, patient transfers have also increased to accommodate clinical needs.. Intensive and coronary care units (ICU/CCU) were designed for the acutely dependent patient, requiring more concentrated nursing and medical care. High costs associated with these units have subsequently led to the development of high dependency and step-down

units, to which clinicians are encouraged to discharge patients as soon as clinically appropriate (Tulloch et al. 2007, Weingarten et al. 1990). By default, these clinical units have added another inpatient transfer process.

In addition, many patient moves are to departments such as imaging or allied health or transfers arising from a need for patient segregation. The frequency of such transfers cannot be underestimated. One 400 bed hospital transferred an average of 80 inpatients to radiology per day (Ong and Coiera 2010) while at least 2.6 transfers per day were made to medical imaging departments from intensive care units (Beglinger 2006). These transfers, although essential for diagnostic or treatment purposes, may disrupt continuity of care and further limit time available for nurses to carry out patient care.

Implications for Nursing Workload

Transferring a patient is workload intensive and takes on average, one hour of nursing time (Hendrich and Lee 2005), while transferring a critical care patient to the ward can take the equivalent of seven workload hours (Chaudhury et al. 2005). A patient transfer is equivalent in nursing time to an admission (Hendrich and Lee 2005), although admitting patients with complex needs can consume up to two hours (Joyce et al. 2005). Hendrich and Lee (2005) found that pre-transfer preparation took an average of 22 minutes, a further 7-10 minutes for the actual transfer and post transfer activities took 31 minutes. Considering that on some wards, patient turnover can be 50% of patients per day (Beglinger 2006, Hendrich et al. 2004, Baernholdt et al. 2010) and that attending to transferred patients accounts for 30% of nursing time (Giangiulio et al. 2008), the impact of transfers on nursing workload is quite substantial.

Perhaps more importantly for nurses, is that Australian and overseas evidence indicates that transfers are occurring more frequently after hours. In the 1990s, the majority of transfers took place during the daytime (McGinty and Ghiz 1993). However, recent studies have

shown that the rate of patient transfers after hours has increased. Between 30-50% of ICU patients (Dawson and Runk 2000, Baernholdt et al. 2010) and almost 36% of ward patients were admitted or transferred during the evening shift, while 10% of ICU and 5.3% of ward patients were relocated during the night (Baernholdt et al. 2010). These are shifts that traditionally have reduced nurse staffing levels (Baernholdt et al. 2010) and so the increase in nursing workload required may have greater impact.

A similar pattern occurs on weekends, and at other times of restricted patient flow and/or access block. As discharges are less likely on weekends and Mondays (Rae et al. 2007, Varnava et al. 2002) patients admitted on these days experience more transfers during their hospitalisation (Blay et al. 2002). This is a problem because weekends are also associated with reduced nurse staffing levels (Weinberg et al. 2002, Hamilton et al. 2007) and admissions and transfers at these times have been linked to negative patient outcomes (Hanane et al. 2008, Schilling et al. 2010, Cutugno 2009). Taking into account that transfers are occurring increasingly after hours when staff numbers are traditionally lower, the impact of patient transfers on nursing workload is likely to be quite significant and no doubt lessens time available for patient care.

Regardless of the destination, the transfer of patients to other departments effectively limits the time that the nurse has for patient assessment and familiarisation, workload planning and to provide care. The consequence of lack of patient availability is that some interventions are provided hastily, inadvertently delayed or even missed. Duffield et al. (2010) report six nursing tasks that at times were not undertaken, perhaps a consequence of the number of patient movements during a patient stay (Duffield et al. 2009). Depending upon hospital policy, nurses maybe required to escort patients to or from such departments (Cook et al. 2000) thus removing them from the clinical area and increasing the workload for the remaining nursing staff. Continuity of care is challenged during the nurse's absence, with

the risk that some nursing interventions may be delayed or even missed for patients remaining on the ward.

Shorter lengths of hospital stay have resulted in patients being discharged soon after acute inpatient episodes. The flow-on from this is that patient throughput has increased which in turn increases nursing workload (Unruh and Fottler 2006). The impact of patient turnover, including patient transfers on nursing workload and responsibility has recently been recognised (Needleman et al. 2011), but at the current time is not considered in workload measures (Duffield et al. 2009, Needleman et al. 2011).

Implications for Patient Outcomes

As indicated earlier, transferring patients between wards and units challenges the capacity to provide continuity of care (Kanak et al. 2008). The transferring nurse is relinquishing responsibility for the patient's care to the receiving ward nurse who relies on effective communication to fully comprehend the patient's needs (O'Connell et al. 2008). Concise and accurate communication between units is essential for continuity of care and helps to alleviate patients' and carers' stress and anxiety (Gustad et al. 2008, Pattison et al. 2007).

During an average LOS of five days, patient and health professional interactions can involve between 17-26 individuals, the majority being nurses (Whitt et al. 2007). Considering that patients may experience at least two transfers within a four day hospitalisation (Duffield et al. 2009) the frequency of transfers to diagnostic departments (Ong and Coiera 2010) and the number of health professionals involved, the number of handovers could be much higher. Furthermore, the increased number of personnel in contact with individual patients challenges the principles of infection control and potentially confuses patients and family members.

Several studies have found an association between poor communication, medication errors and patient transfers (Boockvar et al. 2004, Boockvar et al. 2009, Zuzelo 2008). Of concern, is that 66% of medication errors were associated with transfers of care (Joint Commission on Accreditation of Healthcare Organizations 2006) with three or more transfers significantly increasing the risk of a medication error (Kanak et al. 2008). Although it is not known if transfers are associated with a specific type of medication error, delays or omissions in medication administration have been associated with inter-hospital transfers (Stolte et al. 2006). It is therefore not unreasonable to assume that internal transfers could also lead to medication delays and/or omissions. As the time spent on individual wards is limited, nurses and other staff do not become familiar with individual medication regimes, increasing the risk of medication delays and other errors. For some patients a delay in medication administration could have negative or even catastrophic, consequences.

Patient falls have also been linked to patient transfers. The risk of a patient falling increases on transfer to another clinical area, with risk increasing further with subsequent moves (Kanak et al. 2008). Further research is needed in this area, as bedspace moves were found to worsen symptoms of delirium in the elderly (McCusker et al. 2001) while allowing patients to remain in the one room throughout hospitalisation reduced the risk of falling (Chaudhury et al. 2009, Hendrich et al. 2004, Clark et al. 2004). It is possible that transferring elderly patients between wards increases disorientation and therefore the risk of falling.

It has long been known that inter-hospital transfers are a risk factor for the spread of micro-organisms (Spelman 2002, Safdar and Maki 2002, Tacconelli 2006). It is not surprising therefore, that evidence relating the spread or acquisition of healthcare-acquired infections and ward transfers is increasing (Nixon et al. 2006, Cunningham et al. 2006b, Eveillard et al. 2001, Cooper et al. 2002, Kanak et al. 2008, Dziekan et al. 2000, DHSSPS 2005).

Transferred patients for example, have been found to have four times the risk of becoming infected with a micro-organism compared to non-transferred patients (Eveillard et al. 2001)

while at the same time the risk of infection for patients already residing on the ward also increases (Leverstein-van Hall et al. 2006, Eveillard et al. 2001, Cunningham et al. 2006b, Dziekan et al. 2000). The rapid turnover of patients per bed as occurs with 'hot-bedding' contributes to high occupancy levels which have been linked to infection outbreaks (Borg et al. 2008, Borg 2003, Cunningham et al. 2006b). Furthermore, time available for bedspace cleaning is reduced which has implications for infection control (Royal Society of Medicine 2006, Cunningham et al. 2006a). This is important because acquiring an infection is associated with longer lengths of hospital stay (NSW Department of Health and Clinical Excellence Commission 2009).

Finally, much has been written on the impact of transfers from ICU on patients and carers. However, the impact on patients of frequent, or ward to ward, transfers has not been well studied. The transfer process can be stressful for patients and carers (Odell 2000, Chaboyer et al. 2007) although if patients are well informed and supported throughout the transfer process stress levels may be minimal (Gustad et al. 2008, Pattison et al. 2007). Literature on patient satisfaction in relation to transfers is also sparse. What is known, is that transfers to the ward can lead to feelings of neglect if the nurses are busy (Giangiulio et al. 2008) that could negatively affect patient satisfaction. The trend for evening and night time transfers is of concern, as negative emotions are more likely if the transfer occurs at short notice or after hours (McKinney and Melby 2002). Considering that transfers are increasingly occurring after hours, on weekends and in response to bed shortages, it is likely that some patients are negatively affected (Kelz et al. 2008, Schilling et al. 2010).

Proof that transfers have contributed to negative patient outcomes is found in the improvement in the number of adverse events in hospitals that have reduced transfer rates. The rate of patient falls, healthcare-acquired infections and medication errors were significantly reduced in hospitals that modified intensive care level beds to acuity-adaptable rooms (Clark et al. 2004, Hendrich et al. 2004). Such rooms eliminate the need to transfer

patients in response to their clinical condition and in so doing reduced the rate of patient transfers by 90% (Hendrich et al. 2004). Collaboration between health care providers improved allowing for greater continuity of nursing care and increased nurse and patient satisfaction (Clark et al. 2004).

Not only is the transfer process workload intensive, it can be costly, inefficient, and fraught with delays. As patient transfers involve considerable service reorganisation, there are many covert costs associated with nursing and ancillary staff salaries (Hendrich and Lee 2005). Not surprisingly, higher hospital costs are associated with a greater number of patient transfers although costs marginalised after five ward transfers (Titler et al. 2005, Titler et al. 2008). Part of the reason for these increased costs is that transfer frequency is associated with longer lengths of hospital stay (Blay et al. 2002, Kanak et al. 2008).

Implications for Nursing Management

As indicated, the patient transfer process is workload intensive for nursing staff and can increase the risk of an adverse event for the patient. Heavy workload and associated stress are cited by nurses as contributing factors for their decision to leave workplaces and even the profession (Duvall and Andrews 2010, Tourangeau et al. 2010). Nurse job satisfaction is closely linked to the provision of quality nursing care and nurse retention (Kramer et al. 2011, Duffield et al. 2011). The frequent transfer of patients reduces time available for nurses to deliver the standards of care that they aspire to. Combined with a heavy workload, reduced job satisfaction has severe implications for nurse turnover. In light of global nursing shortages, nurse managers need to examine ways to reduce nurse workload as part of the nurse retention and recruitment strategy. Reducing unnecessary, or non-clinical patient transfers, particularly after hours, would help lighten nurse workload, and have a positive effect on continuity of care and adverse events for patients. One way that nursing workload relative to patient transfers can be addressed, is to incorporate patient turnover in nursing workload or staffing measures (Duffield et al. 2009, Needleman et al. 2011). Western

Australia is possibly the first area to successfully do this. In this State, wards are categorised into various groups according to unit characteristics for the purposes of predicting nurse staffing requirements (Twigg and Duffield 2009). The percentage of patient turnover (admissions, transfers and discharges) was a major feature of the groupings, although it is unknown if this included transfers to departments for diagnostic or procedural purposes. When introduced, this workload measure positively influenced staff recruitment and retention.

Hospitals are complex, dynamic organisations and therefore reducing unnecessary transfers will require a systematic approach. Some hospitals have achieved substantial reductions in patient transfers, healthcare acquired infections and other adverse events by establishing acuity-adaptable rooms for medical and surgical patients (Hendrich et al. 2004, Clark et al. 2004). Associated with reductions in patient transfers, the streamlined model of nursing care reduced nursing workload (Hendrich et al. 2004) and enhanced nurse satisfaction as evidenced by substantial reductions in nurse turnover (Clark et al. 2004, Winter et al. 2011).

Further reductions in patient transfers could be achieved by the appropriate selection and admission of patients to short-stay areas. Stringent short-stay admission policies would naturally reduce the transfer rate and serve to increase service efficiency (Brand et al. 2010) further enhancing continuity of care and nurse workload.

In some hospitals, non-clinical staff allocate beds for admission and transfer patients which can lead to miscommunication between clinical and non-clinical staff (Abraham and Reddy 2010). It is possible that some patients are allocated a bed inappropriate for their clinical needs or to an area with staffing difficulties. The ward or unit nurse manager should ultimately have the authority to make decisions about admissions, transfers and discharges based upon clinical judgement and current ward climate preferably with the assistance of a comprehensive workload measurement tool.

Inevitably, some patients will need to be transferred for clinical reasons. As has been discussed the risk of an adverse event, is increased with each patient move. The electronic medical record, currently being rolled out in Australia, is set to improve documentation and communication between hospital departments which ultimately may reduce the rate of adverse events (Hillestad et al. 2005). This is important considering the frequency of patient transfers and the numerous staff interactions necessary for patient care.

Conclusion

The manuscript aims to raise awareness of the impact of bed flow strategies on patient transfers, patient outcomes and nursing workload. The incidence of patient transfers between wards and units is increasing within the hospital system, in Australia and other Western countries. The shortage of hospital beds and continuing demand for healthcare has led to new approaches to bed management which while ensuring a patient is admitted to a hospital bed, may also result in an increase in transfers between beds and wards.

The flow-on effect of such bed management strategies has not only led to an increase in patient transfers but has also had an impact on nursing workload that has been under recognised. The negative impact on nursing workload can only be fully realised if workload measures incorporate all aspects of patient turnover including patient transfers.

Given current nursing staff shortages and continuing demand for healthcare, reducing patient transfers would positively reduce nurse workload, improve patient outcomes and potentially help patient throughput.

Conflict of Interest

The authors declare that there is no known conflict of interest associated with this study.

References

- Abraham, J. & Reddy, M. C. 2010. Challenges to inter-departmental coordination of patient transfers: A workflow perspective. *International Journal of Medical Informatics*, 79, 112-122.
- AIHW 2006. Australian hospital statistics 2004–05. Canberra: Australian Institute of Health and Welfare.
- AIHW 2007. Older Australia at a glance: 4th edition. In: Australian Institute of Health and Welfare (ed.) 4th edition ed. Canberra: Australian Institute of Health and Welfare.
- AIHW 2010. Australian hospital statistics 2008-09. *Health services series no. 17*. Canberra: Australian Institute of Health & Welfare.
- Australasian College for Emergency Medicine 2004. *Access Block and Overcrowding in Emergency Departments*. ACEM, Accessed June 22, 2008.
- Australian Medical Association 2008. *Public Hospital Report Card 2008: an AMA analysis of Australia's public hospital system*. AMAKingston, ACT, Accessed 27, March 2008, Available: <http://www.ama.com.au/node/4232>.
- Baernholdt, M., Cox, K. & Scully, K. 2010. Using clinical data to capture nurse workload: implications for staffing and safety. *CIN: Computers, Informatics, Nursing*, 28, 229-234.
- Basic, D. & Khoo, A. 2009. Admission variables predicting short lengths of stay of acutely unwell older patients: relevance to emergency and medical short-stay units. *Australian Health Review*, 33, 502-512.
- Beglinger, J. E. 2006. Quantifying Patient Care Intensity: An Evidence-based Approach to Determining Staffing Requirements. *Nursing Administration Quarterly* 30, 193-202.
- Blay, N., Donoghue, J. & Mitten-Lewis, S. 2002. A retrospective comparative study of patients with chest pain and intra-ward transfers. *Australian Health Review*, 25, 145-153.
- Boockvar, K., Fishman, E., Kyriacou, C. K., Monias, A., Gavi, S. & Cortes, T. 2004. Adverse Events Due to Discontinuations in Drug Use and Dose Changes in Patients Transferred Between Acute and Long-term Care Facilities. *Archives of Internal Medicine*, 164, 545-550.
- Boockvar, K., Liu, S., Nebeker, J., Siu, A. & Fried, T. 2009. Prescribing discrepancies likely to cause adverse drug events after patient transfer. *Quality & Safety in Health Care*, 18, 32-36.
- Borg, M. 2003. Bed occupancy and overcrowding as determinant factors in the incidence of MRSA infections within general ward settings. *Journal of Hospital Infection*, 54, 316-318.
- Borg, M. A., Suda, D. & Scicluna, E. 2008. Time-Series Analysis of the Impact of Bed Occupancy Rates on the Incidence of Methicillin-Resistant Staphylococcus aureus Infection in Overcrowded General Wards. *Infection Control & Hospital Epidemiology*, 29, 496-502.
- Brand, C. A., Kennedy, M. P., King-Kallimanis, B. L., Williams, G., Bain, C. A. & Russell, D. M. 2010. Evaluation of the impact of implementation of a Medical Assessment and Planning Unit on Length of stay. *Australian Health Review*, 34, 334-339.
- Bryant, D. & Adams, J. 2009. Experience of mixed-sex bays in a general hospital. *Nursing Standard*, 24, 41-46.
- Cappsa, C., Dranoveb, D. & Lindrooth, R. C. 2010. Hospital closure and economic efficiency. *Journal of Health Economics*, 29, 87-109
- Chaboyer, W., Thalib, L., Alcorn, K. & Foster, M. 2007. The effect of an ICU liaison nurse on patients and family's anxiety prior to transfer to the ward: An intervention study. *Intensive and Critical Care Nursing*, 23, 362-369.
- Chaudhury, H., Mahmood, A. & Valente, M. 2005. Advantages and Disadvantages of Single-Versus Multiple-Occupancy Rooms in Acute care Environments: A Review and Analysis of the Literature. *Environment and Behaviour*, 37, 760-786.
- Chaudhury, H., Mahmood, A. & Valente, M. 2009. The Effect of Environmental Design on Reducing Nursing Errors and Increasing Efficiency in Acute Care Settings : A Review and Analysis of the Literature. *Environment and Behavior*, 41, 755-786.
- Chetter, T. G. 2009. Statistical process control part 2: using statistical process control to measure process improvement in patient flow. *Australian Health Review*, 33, 412-422.

- Clark, E., I., Roberts, C., L. & Traylor, K., C. 2004. Cardiovascular Single-Unit Stay: A case study in change. *American Journal of Critical Care*, 13, 406.
- Clements, A., Halton, K., Graves, N., Pettitt, A., Morton, A., Looke, D. & Whitby, M. 2008. Overcrowding and understaffing in modern health-care systems: key determinants in meticillin-resistant *Staphylococcus aureus* transmission. *The Lancet Infectious Diseases*, 8, 427-434.
- Cook, R., Gardner, G. & Gardner, A. 2000. A national survey: transporting patients within Australian hospitals. *Australian Health Review*, 23, 108-114.
- Cooper, E., Paull, A. & O'Reilly, M. 2002. Characteristics of a large cluster of vancomycin-resistant enterococci in an Australian Hospital. *Infection Control & Hospital Epidemiology*, 23, 151-153.
- Cunningham, J. B., Kernohan, W. G. & Rush, T. 2006a. Bed occupancy, turnover interval and MRSA rates in Northern Ireland. *British Journal of Nursing*, 15, 324-328.
- Cunningham, J. B., Kernohan, W. G. & Rush, T. 2006b. Bed occupancy, turnover intervals and MRSA rates in English hospitals. *British Journal of Nursing*, 15, 656-660.
- Cutugno, C. 2009. Nighttime transfer from the ICU increases risk of death. *The American Journal of Nursing*, 109, 70.
- Dawson, S. & Runk, J. 2000. Right Patient? Right Bed? A Question of Appropriateness. *American Association of Critical-Care Nurses*, 11, 375-385.
- Deines, E. & Stevens, B. 1987. Reducing In-House Transfers Improves Cost Effectiveness. *Nursing Management*, 18, 54-57.
- DHSSPS 2005. *Protecting Patients and Staff - A Strategy for Prevention and Control of Healthcare Associated Infections in Northern Ireland 2005-2010*. Department of Health Social Services and Public Safety, Belfast, Accessed February 12, 2010, Available: <http://www.dhsspsni.gov.uk/prevention-of-hcais.pdf>.
- Downing, H., Scott, C. & Kelly, C. 2008. Evaluation of a dedicated short-stay unit for acute medical admissions. *Clinical Medicine*, 8, 18-20.
- Duffield, C., Diers, D., Aisbett, C. & Roche, M. 2009. Churn: Patient Turnover And Case Mix. *Nursing Economics*, 27, 185.
- Duffield, C., Roche, M., O'Brien-Pallas, L., Diers, D., Aisbett, C., King, M., Aisbett, K. & Hall, J. 2007. *Glueing it Together: Nurses, Their Work Environment and Patient Safety*. University of Technology, Sydney, Nsw Department of Health, Accessed February 29, 2008, Available: http://www.health.nsw.gov.au/pubs/2007/pdf/nwr_report.pdf.
- Duffield, C. M., Roche, M. A., Blay, N. & Stasa, H. 2011. Nursing unit managers, staff retention and the work environment. *Journal of Clinical Nursing*, 20, 23-33.
- Duvall, J. J. & Andrews, D. R. 2010. Using a Structured Review of the Literature to Identify Key Factors Associated With the Current Nursing Shortage. *Journal of Professional Nursing*, 26, 309-317.
- Dziekan, G., Hahn, A., Thune, K., Schwarzer, G., Schafer, K., Daschner, F. & Grundmann, H. 2000. Methicillin-resistant *Staphylococcus aureus* in a teaching hospital: investigation of nosocomial transmission using a matched case-control study. *Journal of Hospital Infection*, 46, 263-270.
- Eveillard, M., Quenon, J., Rufat, P., Mangeol, A. & Fauvelle, F. 2001. Association between hospital-acquired infections and patients' transfers. *Infection Control & Hospital Epidemiology*, 22, 693-696.
- Garling, P. 2008. Final Report of the Special Commission of Inquiry Acute care Services in NSW Public Hospitals Volume 3,.
- Giangiulio, M., Aurilio, L., Baker, P., Brienza, B., Moss, E. & Twinem, N. 2008. Initiation and Evaluation of an Admission, Discharge, Transfer (ADT) Nursing Program in a Pediatric Setting. *Issues in Comprehensive Pediatric Nursing*, 31, 61-70.

- Gilligan, P., O'Kelly, P., Hegarty, D. & Winder, S. 2009. The Transit/Admission Lounge Study. *Irish Medical Journal*, 102, 19-21.
- Gustad, L. T., Chaboyer, W. & Wallis, M. 2008. ICU patient's transfer anxiety: a prospective cohort study. *Australian Critical Care*, 21, 181-189.
- Hamilton, K. E. S., Redshaw, M. E. & Tarnow-Mordi, W. 2007. Nurse staffing in relation to risk-adjusted mortality in neonatal care. *Archives of Disease in Childhood - Fetal & Neonatal Edition*, 92, F99-F103.
- Hanane, T., Keegan, M., Seferian, E. G., Gajic, O. & Arfessa, B. 2008. The association between nighttime transfer from the intensive care unit and patient outcome. *Critical Care Medicine*, 36, 2232-2237.
- Hartley, E., Hood, E., Bashir, N. & Zahir, R. Examining the suitability of medical admissions to the emergency short stay ward of a large UK hospital (*poster presentation*). In: 30th International Symposium on Intensive Care and Emergency Medicine, March 9-12, 2010 Brussels, Belgium. Abstract in: *Critical Care 2010*, 14(Suppl 1):p278, doi.10.1186/cc8510
- Health & Safety Executive 2008. Guidance for managing shiftwork and fatigue offshore. *Offshore Information Sheet No. 7/2008*. HSE.
- Hendrich, A. L., Fay, J. & Sorrells, A. K. 2004. Effects of acuity-adaptable rooms on flow of patients and delivery of care. *American Journal of Critical Care*, 13, 35.
- Hendrich, A. L. & Lee, N. 2005. Intra-Unit Patient Transports: Time, Motion, and Cost Impact On Hospital Efficiency. *Nursing Economics*, 23, 157-164.
- Hillestad, R., Bigelow, J., Bower, A., Girosi, F., Meili, R., Scoville, R. & Taylor, R. 2005. Can Electronic Medical Record Systems Transform Health Care? Potential Health Benefits, Savings, And Costs. *Health Affairs* [Online], 24. Accessed Sept/Oct Available: <http://content.healthaffairs.org/cgi/reprint/24/5/1103>.
- Iemma, M. & NSW Health 2004. 973 extra beds for NSW hospitals.
- Joint Commission on Accreditation of Healthcare Organizations 2006. Using medication reconciliation to prevent errors. *Sentinel Event Alert*. January 25, 2006 ed.: JACHO.
- Joyce, C., Kielbaso, M., Lincks, J., Reuf, D. & Sizemore, C. 2005. Discharge teams keep things moving. *Nursing Management*, 36, 36-39.
- Kanak, M. F., Titler, M., Shever, L., Fei, Q., Dochterman, J. & Picone, D. M. 2008. The effects of hospitalization on multiple units. *Applied Nursing Research*, 21, 15-22.
- Kelz, R., Freeman, K., Hosokawa, P. W., Asch, D. A., Spitz, F. R., Moskowitz, M., Henderson, W. G., Mitchell, M. E. & Itani, K. 2008. Time of Day Is Associated With Postoperative Morbidity: An Analysis of the National Surgical Quality Improvement Program Data. *Annals of Surgery*, 247, 544-552.
- Kramer, M., Maguire, P. A. T. & Brewer, B. B. 2011. Clinical nurses in Magnet hospitals confirm productive, healthy unit work environments. *Journal of Nursing Management*, 19, 5-17.
- Leverstein-van Hall, M., Blok, H. E., Paauw, A., Fluit, A. C., Troelstra, A., Mascini, E. M., Bonten, M. J. & Verhoef, J. 2006. Extensive Hospital-Wide Spread of a Multidrug-Resistant Enterobacter cloacae Clone, with Late Detection Due to a Variable Antibigram and frequent Patient Transfer. *Journal of Clinical Microbiology*, 44, 518-524.
- McCusker, J., Cole, M., Abrahamowicz, M., Han, L., Podoba, J. E. & Ramman-Haddad, L. 2001. Environmental Risk Factors for Delirium in Hospitalized Older People. *Journal of the American Geriatrics Society*, 49, 1327-1334.
- McGinty, B. & Ghiz, J. 1993. Developing a Nursing Managed Central Transportation Service. *Nursing Management*, 24, 62-65.
- McKinney, A. A. & Melby, V. 2002. Relocation stress in critical care: a review of the literature. *Journal of Clinical Nursing*, 11, 149-157.
- Needleman, J., Buerhaus, P., Pankratz, S., Leibson, C. L., Stevens, S. R. & Harris, M. 2011. Nurse Staffing and Inpatient Hospital Mortality. *New England Journal of Medicine*, 36, 1037-1045.

- Nixon, M., Jackson, B., Varghese, P., Jenkins, D. & Taylor, G. 2006. Methicillin-resistant *Staphylococcus aureus* on orthopaedic wards: Incidence, Spread, Mortality, Cost and Control. *Journal of Bone and Joint Surgery*, 88, 812.
- NSW Department of Health & Clinical Excellence Commission 2009. Incident Management in the NSW Public Health System 2008: January - June. Sydney: CEC.
- NSW Health 2010. Same Gender Accommodation. *PD2010_005*. Sydney: NSW Health.
- O'Connell, B., Macdonald, K. & Kelly, C. 2008. Nursing handover: it's time for a change. *Contemporary Nurse*, 30, 2-11.
- Odell, M. 2000. The patient's thoughts and feelings about their transfer from intensive care to the general ward. *Journal of Advanced Nursing*, 31, 322-329.
- Ong, M.-S. & Coiera, E. 2010. Safety through redundancy: a case study of in-hospital patient transfers. *Quality & Safety in Health Care* [Online]. Accessed October 27, 2010 Available: <http://qshc.bmj.com/content/early/2010/07/29/qshc.2009.035972.abstract>.
- Orendi, J. 2008. Health-care organisation, hospital-bed occupancy, and MRSA. *The Lancet*, 371, 1401-1402.
- Pattison, N. A., Dolan, S., Townsend, P. & Townsend, R. 2007. After critical care: a study to explore patients' experiences of a follow-up service. *Journal of Clinical Nursing*, 16, 2122-2131.
- Proudlove, N. C., Gordon, K. & Boaden, R. 2003. Can good bed management solve the overcrowding in accident and emergency departments? *Emergency Medicine Journal*, 20, 149--156.
- Rae, B., Busby, W. & Millard, P. H. 2007. Fast-tracking acute hospital care - from bed crisis to bed crisis. *Australian Health Review*, 31, 50-60.
- Rocker, G. M., Cook, D. J., Martin, D. K. & Singer, P. A. 2003. Seasonal bed closures in an intensive care unit: A qualitative study. *Journal of Critical Care*, 18, 25-30.
- Royal Society of Medicine 2006. *Clinical governance in a changing NHS*, London, Royal Society of Medicine Press.
- RQIA 2008. *Review of the outbreak of Clostridium difficile in the Northern Health and Social Care Trust*. The Regulation and Quality Improvement Authority, Accessed February 12, 2010, Available: <http://www.dhsspsni.gov.uk/assemblydocumentcdiff14108.pdf>.
- Safdar, N. & Maki, D. G. 2002. The Commonality of Risk Factors for Nosocomial Colonization and Infection with Antimicrobial-Resistant *Staphylococcus aureus*, *Enterococcus*, Gram-Negative Bacilli, *Clostridium difficile*, and *Candida*. *Annals of Internal Medicine*, 136, 834-844.
- Schilling, P., Campbell, D. J., Englesbe, M. & Davis, M. 2010. A comparison of in-hospital mortality risk conferred by high hospital occupancy, differences in nurse staffing levels, weekend admission, and seasonal influenza. *Medical Care*, 48, 224-232.
- Simon, M., Yankovskyy, E., Klaus, S., Gajewski, B. & Dunton, N. 2011. Midnight census revisited: Reliability of patient day measurements in US hospital units. *International Journal of Nursing Studies*, 48, 56-61.
- Spelman, D. W. 2002. Hospital-acquired infections. *Medical Journal of Australia*, 176, 286-291.
- Sprivulis, P., C. , Da Silva, J.-A., Jacobs, I., G. , Frazer, A., R. L. & Jelinek, G., A. 2006. The association between hospital overcrowding and mortality among patients admitted via Western Australian emergency departments. *Medical Journal of Australia*, 184, 208.
- Stolte, E., Iwanow, R. & Hall, C. 2006. Capacity-related interfacility patient transports: patients affected, wait times involved, and associated morbidity. *Journal of the Canadian Association of Emergency Physicians*, 8, 262-268.
- Tacconelli, E. 2006. New strategies to identify patients harbouring antibiotic-resistant bacteria at hospital admission. *Clinical Microbiology and Infection*, 12, 102-109.
- Taylor, D. M., Bennett, D. M. & Cameron, P. A. 2004. A paradigm shift in the nature of care provision in emergency departments. *Emergency Medicine Journal*, 21, 681-684.
- Thompson, S., Nunez, M., Garfinkel, R. & Dean, M. D. 2009. Efficient Short-Term Allocation and Reallocation of Patients to Floors of a Hospital During Demand Surges. *Operations Research*, 57, 261-273.

- Titler, M., Xian-Jin, X., Dochterman, J., Kanak, M., Picone, D. M., Qiang, F. & Everett, L. 2005. Cost of Hospital Care for Elderly At Risk of Falling. *Nursing Economic\$,* 23, 290-306.
- Titler, M. G., Jensen, G. A., Dochterman, M. J., Xie, X.-J., Kanak, M., Reed, D. & Shever, L. L. 2008. Cost of Hospital Care for Older Adults with Heart Failure: Medical, Pharmaceutical, and Nursing Costs. *Health Services Research,* 43, 635-655.
- Tourangeau, A. E., Cummings, G., Cranley, L. A., Ferron, E. M. & Harvey, S. 2010. Determinants of hospital nurse intention to remain employed: broadening our understanding. *Journal of Advanced Nursing,* 66, 22-32.
- Tulloch, A., How, C., Brent, M., Chapman, R., Burns, B. & Pomery, S.-M. 2007. Admission and discharge practices: High Dependency Unit audit outcome. *Contemporary Nurse,* 24, 15-24.
- Twigg, D. & Duffield, C. 2009. A review of workload measures: A context for a new staffing methodology in Western Australia. *International Journal of Nursing Studies,* 46, 132-140.
- Unruh, L. Y. & Fottler, M. D. 2006. Patient Turnover and Nursing Staff Adequacy. *Health Services Research,* 41, 599-612.
- Varnava, A., Sedgwick, J., Deaner, A., Ranjadayalan, K. & Timmis, A. 2002. Restricted weekend service inappropriately delays discharge after acute myocardial infarction. *Heart,* 87, 216-219.
- Weinberg, A., Lesesne, A., Richards, C. & Pals, P. 2002. Quality care indicators and staffing levels in a nursing facility subacute unit. *Journal of the American Medical Directors Association,* 3, 1-4.
- Weingarten, S., Ermann, B., Bolus, R., Riedinger, M. S., Rubin, H., Green, A., Karns, K. & Ellrodt, A. G. 1990. Early "Step-Down" Transfer of Low-Risk Patients with Chest Pain. *American College of Physicians,* 113, 283-289.
- Weissman, J., S. , Rothschild, J., M. , Bendavid, E., Sprivulis, P., Cook, E. F., Evans, R. S., Kaganova, Y., Bender, M., David-Kasdan, J., Haug, P., Lloyd, J., Selbovitz, L. G., Murff, H. J. & Bates, D. W. 2007. Hospital Workload and Adverse Events. *Medical Care,* 45, 448-455.
- West, D. 2010. Hospital bed transfers put thousands of patients at risk of infection. *Nursing times.net* [Online]. Accessed October 27, 2010 Available: <http://www.nursingtimes.net/specialist-news/infection-control-news/hospital-bed-transfers-put-thousands-of-patients-at-risk-of-infection/5019997.article>.
- Whitt, N., Harvey, R., McLeod, G. & Child, S. 2007. How many health professionals does a patient see during an average hospital stay? *The New Zealand Medical Journal* [Online], 120. Accessed <http://www.nzma.org.nz/journal/120-1253/2517/>.
- Winter, M., Tjong, L. & Houston, S. L. 2011. The challenges and rewards of the cardiac universal bed model. [Miscellaneous Article]. *Nursing Management* 42, 46-50.
- Zuzelo, P. R. 2008. Patient Safety: Preventing Unintended Consequences and Reducing Errors. *The Clinical Nurse Specialist Handbook*. 2nd ed. Sudbury, MA: Jones & Bartlett.