

Australian Patient Safety Bulletin

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Each issue of the Australian Patient Safety Bulletin highlights a sample of the many articles in the field of quality and safety published in the preceding four months. Summaries of the selected articles are prepared by staff and PhD students of the Centre of Research Excellence in Patient Safety. Articles included in this issue represent a mix of original research and commentaries/viewpoints, and highlight topics such as systems redesign, patient complaints, falls prevention, relationships between nurse staffing and quality of care, and data quality.

In addition, each issue of the Bulletin in 2008 will include an article focusing on one area of research being conducted within CRE-PS. In this issue, Megan Bohensky, a PhD student in the Centre, provides an overview of data linkage and its importance in patient safety and quality research. The next issue will focus on research using clinical registries.

Upcoming seminar

Recent critical events that have seriously affected patient safety, such as the Bundaberg Hospital story, raise concerns and stir debate about our existing and planned systems for credentialing of health care professionals. The seminar will:

- Explore issues and controversies relating to credentialing in health care
- Identify discipline specific challenges to credentialing in medicine and nursing
- Encourage awareness and debate on credentialing of professionals in a health care context.

Date: Friday, August 15, 2008

Time: 09.00 - 4.30 pm (Registration opens at 08.30)

Venue: The Robson Lecture Theatre
Royal Adelaide Hospital
North Terrace
Adelaide SA 5000

Further information is available on the CRE-PS website at www.CREpatientsafety.org.au. Alternatively, please direct telephone enquiries to Catherine Pound 03 9903 0891 or Peta McLaughlin 03 9903 0245.

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Collaborating institutions include: Bayside Health, University of Queensland, Melbourne Health, Southern Health, Wimmera Healthcare Group, ACT Health, ANU Centre for Health Stewardship, Victorian Institute of Forensic Medicine, CSIRO, Medical Defence Association of Victoria, Peninsula Health, Queensland Health, Australian Centre for Health Innovation, South Australian Department of Health, Western Australian Department of Health, Australian Institute for Health and Welfare (AIHW), Commonwealth Department of Health and Ageing, Australian Council for Healthcare Standards (ACHS), Victorian Department of Human Services, Monash University Department of General Practice, Clinical Excellence Commission, Melbourne Pathology, Peter MacCallum Cancer Centre, Princess Alexandra Hospital, Boston University (US), Veterans' Affairs (US), Imperial College School of Medicine.(UK), Bergen University (Norway).

A targeted multifactorial intervention to prevent falls among older people in hospital

Cumming RG, Sherrington C, Lord SR, Simpson JM, Vogler C, Cameron ID, Naganathan V, and The Prevention of Older People's Injury Falls Prevention in Hospitals Research Group. Cluster randomised trial of a targeted multifactorial intervention to prevent falls among older people in hospital. *BMJ* published online 10 March 2008; doi: 10.1136/bmj.39499.546030.BE



Although falls among older people during hospitalisation is a serious problem often resulting in injury, increased length of stay and increased costs, little evidence is available to inform prevention strategies. Two studies^{1,2} have reported that multifactorial interventions have reduced fall rates in long stay sub-acute and rehabilitation wards; however there is little evidence of this approach being effective for reducing falls of older people in more typical short stay hospital settings. The purpose of this Australian study was to assess the efficacy of a multifactorial falls prevention program targeting older people in short stay acute and rehabilitation care hospital wards.

A cluster randomised trial design was used to compare fall rates in 12 matched pairs of short stay wards (median stay 7 days), in 12 hospitals in Sydney. One ward in each pair was randomly assigned to receive a multifactorial intervention that included: fall risk assessment; staff and patient education; drug review; modification of bedside and ward environment; increased supervision; provision of suitable walking aids; management of foot problems and confusion; exercise programs; and personal alarms for high risk patients.

The interventions were delivered by a nurse and a physiotherapist to each ward for three months, with pairs of wards participating sequentially over a three year period. The rationale for using a cluster design was that some aspects of the intervention, such as staff education and environmental modifications would effect change in whole wards of people rather than just individuals.

Results: Analysis at both cluster (ward) and individual (adjusted for clustering) level found no significant difference between intervention and control wards for frequency of falls or injurious falls, during the three month study period. Restricting analysis of falls frequency to times when intervention staff were most likely to be present, and to the second and third months of the intervention period similarly failed to show any intervention effect.

The authors suggest these results could be explained by the short time of exposure of individuals (median seven days) and staff (three months) to the interventions, and by the difficulty associated with addressing risk factors for falls such as confusion, gait instability and incontinence.

1 Haines TP, Bennell KL, Osbourne RH, Hill KD. Effectiveness of targeted falls prevention programme in subacute hospital setting: randomized controlled trial. *BMJ* 2004;328:676-9.

2 Healey F, Monro A, Cockram A, Heseltine D. Using targeted risk factor reduction to prevent falls in older in-patients: a randomized controlled trial. *Age Ageing* 2004;33:390-5.

Also, weaknesses in study design, including lack of blinding of data collectors and staff in intervention wards, as well as the prior adoption of some falls prevention measures strategies in all wards, may have reduced the sensitivity of the study to detect intervention effects. They conclude that innovative approaches, including improved cognitive assessment, better ward design and changed nursing practices are needed to address this issue successfully.

Take home message: A cluster randomised trial found that a multifactorial falls prevention program was not effective for reducing falls among older people during short lengths of stay in acute and rehabilitation elderly care wards in hospitals in Sydney. Explanations offered for the observed lack of effectiveness include the short time frame for intervention to be implemented, the intractable nature of fall risk factors, and study design limitations. It is suggested that innovative approaches to falls prevention are needed.

Review of quality of care in the UK

Dixon J Darzi's review of quality of care in the NHS. *BMJ* 2008;336: 844-5.

This editorial makes reference to the major review of NHS policy being conducted by Lord Darzi in the UK, which is due to report in June 2008. The review focused on three broad areas: what world class quality of care looks like in a range of clinical areas; enablers and barriers to achieving world class care such as leadership and workforce; and "other" which includes work on informatics, examining the case for an NHS constitution, and looking at "system incentives". The commentary argues that it is the "systems incentives" that will determine the success or failure of the review more than more up-to-date evidence based clinical pathways, despite their importance.

The editorial argues that Lord Darzi should have an open mind on the advantages of competition in the healthcare sector using the USA experience as an example. An examination of 5 top performing managed care organisations in the US¹ concluded that it is as important to consider how to motivate institutions to provide good quality care as to define good quality.

The editorial mentions some examples where incentives have been introduced into the UK health system in primary care, NHS trusts and the independent sector with varying results and gives an example where an incentive offered to two separate sectors results in conflicting outcome objectives. Darzi is urged to focus on incentives to institutions rather than to teams or individuals within them. Pilot studies are proposed to evaluate more controversial models, and increase the evidence base of policy making.

Take home message: Provision of financial incentives and promoting competition between institutions as motivators to improve the quality of care are controversial. Their role in achieving a health system that is effective, efficient, responsive and equitable needs to be evaluated. Health policy should be based on the best available evidence.

1 Dixon J, Lewis R, Rosen R, Finlayson B, Gray D. Can the NHS learn from 3 US managed care organisations? *BMJ* 2004;328:223-6.

Implementing and sustaining transformational change in health care: lessons learnt about clinical process redesign

McGrath KM, Bennett DM, Ben-Tovim DI, Boyages SC, Lyons NJ and O'Connell TJ. *Implementing and sustaining transformational change in health care: lessons learnt about clinical process redesign. MJA 2008; 188: S32-S35.*

Clinical process redesign is defined as a health care improvement method that involves the redesign of the processes and services underpinning clinical care to make them safer and more efficient for patients and more satisfying for staff.¹ While clinical process redesign has the potential to enable significant improvements in patient care, it is not always implemented successfully.

This paper discusses eight key factors that have been critical to the clinical process redesign implementation initiatives in New South Wales Health and Flinders Medical Centre that took place since August 2004 and November 2003, respectively.

1. Leadership by senior executives

It is recommended that senior executive staff members are directly involved in the process redesign. In New South Wales, the NSW Director-General of Health and the NSW Minister for Health made regular visits to clinical redesign sites.

2. Clinical leadership

To engage clinicians, solutions should be led by staff, with management committing in advance to implementing their ideas. Gaining clinician support also requires consideration of clinicians' needs, such as short meetings at convenient times.

3. Team-based problem solving

The teams that are involved in the work should be involved in all related activities in consultation with re-design experts.

4. A focus on the patient journey

It is suggested that patients be grouped together by similar journeys, which is broader than disease-related groupings. This will assist in simplifying the re-design process.

5. Access to data

Using performance data to support and monitor changes will make processes more robust. Monitoring the outcomes of process redesign against set targets will also help to monitor progress.

6. Ambitious targets

To stimulate innovation, targets should be ambitious to encourage original thinking and solutions.

7. Strong performance management

External management and expert consultation may be required to break down barriers in thinking and keep staff motivated.

8. Process for maintaining improvement

A regular forum should exist where the process and changes can be discussed with stakeholders and continuously improved upon.

Take home message: Clinical process redesign can improve patient care but requires a careful planning and implementation process to encourage change. The eight items listed above can assist other organisations, who may be implementing redesign projects at their own institutions.

Groups push physicians and patients to embrace electronic health records



Hampton T. *Groups push physicians and patients to embrace electronic health records. JAMA 2008; 299(5): 507-9.*

Information technology is a vehicle that has the potential to reduce medical error and costs. Electronic health records (EHRs) are an emerging technology, aimed at eliminating handwritten clinical data, thereby decreasing errors and increasing the ease of storage. They allow for longitudinal records that track all medical interactions for a particular patient and provide comprehensive data across populations.

EHR models present numerous challenges to health care systems, physicians, and regulators. This commentary discusses how Government and not-for-profit organisations, as well as technology groups such as Google and Microsoft, are encouraging the adoption of EHRs among hospitals, physicians and patients despite existing concerns, including affordability and privacy.

Microsoft's Health Vault, which is a free service platform, is designed to help people better manage and monitor their personal health information and is an example that allows for health care data collection by the patient and doctor alike.

The concerns that exist include different approaches to patient autonomy, privacy, and confidentiality within health care. In this area of health information there may be a conflict of interest between the needs of those delivering, regulating, and paying for health care and the principles of privacy and confidentiality.

Technological acquisition, storage, access to, and distribution of patient health data do not assist in dispelling this conflict. Despite this, providers have embraced confidentiality in order to encourage patients to disclose their health-related information.

According to Hampton, the groups envision an EHR system that is easily accessible, increases efficiency, reduces costs and promotes standardisation of care.

This article provides explanation of some of the reasons for the advancement of EHRs and discusses some of the professional, practical, and legal challenges that health care providers potentially face both during and after EHR implementation. It is notable that even though there has been a significant improvement in EHR systems, only a minority of consumers are investing in the technology.

1 O'Connell TJ, Ben-Tovim DI, McCaughan BC, Szwarcbord MG, McGrath KM. Health Services Under Siege - Glossary. *Med J Aust* 2008; 188 (6 Suppl): S9-S13.

Take home message: This article highlights the potential value of EHRs in reducing costs and decreasing medical errors. It demonstrates why Governments and companies are driving this development and investing in its future. Nevertheless, there are barriers to be overcome if such systems are to be successfully implemented and their benefits realised.

Dealing with complaints



Cave J, Dacre J. *Dealing with Complaints*. *BMJ* 2008; 336:326-8.

Complaints from patients or their representatives are rare. Often, these complaints follow an adverse event but can also occur when nothing has seemingly “gone wrong”. Moreover, not all adverse events are followed by a complaint. Patients are often seeking an apology, an outline of the events that occurred, the consequences of these events as well as what steps are being taken to safeguard against similar situations re-occurring. Often a chain of events that the patient perceives as poor will motivate a complaint. Seventy-two percent of complaints were found to relate to staff insensitivity or a breakdown in communication.

Patient complaints typically flow through an escalating series of committees, firstly through the internal complaints mechanisms at the hospital which sometimes results in an internal inquiry. If the complaint fails to be resolved within the hospital, patients may proceed to litigation, although with fewer than 50 cases per year in the UK alone, this is a rare event. Medical councils also act as external bodies that can review the actions of clinical staff, particularly in matters concerning repeated errors, failure to conduct proper examinations, dishonest behaviour, or misuse of alcohol or drugs by clinical staff.

To reduce complaints, the article suggests that doctors (indeed all clinical staff) need to reduce the number of adverse events occurring and improve their communication skills with patients. Following an adverse event, patients need treatment for the physical effects as well as encouragement and support for the fear and loss of trust they will likely experience.

Apologies for the emotional distress are likely to be well received by patients if they are coupled with accurate and comprehensive information relating to the event, given as soon as possible following the event.

Clinicians becoming aware of adverse events should inform senior staff as soon as possible, allowing the appropriate steps such as patient/clinician meetings to proceed in a timely manner. The article stresses the importance of following recognised complaints channels, to allow efficient and appropriate redressing of patient complaints. Ultimately it is vital to listen to the patients’ concerns, to take them seriously, answer questions if possible and direct the complaint to the appropriate body. The influence of the complaint on the clinical team or the individual also needs recognition, as a patient’s anger or fear as a result of their treatment can have a serious impact upon clinical staff. Discussing the issues with senior staff and/or counsellors within the hospital or healthcare facility can be an important step in resolving the complaint for the clinician.

Take home message: Reducing the blame culture which pervades healthcare, will greatly assist in increasing the open exchange of information between clinicians and patients. Recognising that medical staff are imperfect and fostering a culture that improves communication between staff and patients is an important step in reducing and dealing with patient complaints.

Effectiveness and efficiency of root cause analysis in medicine

Wu AW, Lipshutz AKM, Pronocost PJ. *Effectiveness and efficiency of root cause analysis in medicine*. *JAMA* 2008; 299(6): 685-7.

Root cause analysis (RCA) is a process used to identify the basic and causal factor(s) that underlie variation in performance. It provides structure to retrospective analysis of errors and is widely used in healthcare following catastrophic or “sentinel” events. This article by Wu et al makes some very important points and highlights the lack of empirical evidence for using RCA.

While RCAs are widely implemented (more than 7000 have been performed at Veterans’ Affairs (VA) institutions and 4100 have been submitted to the Joint Commission), no peer-reviewed studies have been undertaken to investigate:

- their effectiveness in reducing risk or improving safety;
- the cost or cost effectiveness of doing RCA compared to other tools to mitigate risk; or
- whether the recommendations provided under the RCA approach (a “systems” approach) have a comparable effect on action taken and outcomes, compared with traditional review processes that focus more on attributing individual blame to adverse events.

Specific problems identified with the RCA process include the fact that:

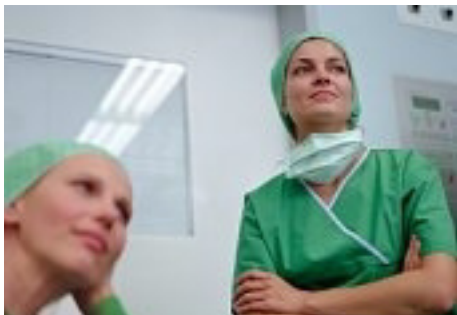
- many RCAs are performed incorrectly or incompletely and do not produce useable results;
- only in 2/3 of cases are recommendations from RCAs fully implemented;
- many recommendations are weak, with one study demonstrating that less than half of all recommendations constituted strong action;
- there is little opportunity to share learning from RCAs undertaken in other institutions or even within the one setting.

The authors suggest that, in moving this forward and to curb the undercurrent of discontent about its limited effectiveness, more effort needs to be directed on fixing the big issues identified through the RCA process but considered too hard for individual institutions to fix themselves. This requires a collaborative effort of stakeholders, e.g. manufacturers and professional societies, and bodies with more influence than individual hospitals to make changes that have the highest probability of success. To make these big changes requires:

- an understanding of the scope of the problem. This is best achieved by aggregating evidence of similar incidents across institutions;
- consensus on what intervention should be initiated to address the identified issue;
- agreement by the various stakeholders on appropriate redesign; and
- appropriate testing to monitor for unintended consequences following redesign.

Take home message: Evaluation of the effectiveness and utility of root cause analysis, and identification of the best way to conduct RCAs is required urgently. Fixing the problem identified by RCA'S is often beyond the scope of individual institutions; it requires collaboration between stakeholders and high-level coordination.

The influence of nurses' work conditions on patient safety.



Collins-Sharp BA, Clancy CM. Limiting nursing overtime, and promoting other good working conditions, influences patient safety. J Nurs Care Qual 2008; 23 (2): 97-100.

This commentary from the Agency for Healthcare Research and Quality reviews a number of studies that demonstrate an evidence-based link between working conditions for nurses and patient safety outcomes. The importance of this link is highlighted by a projected shortfall in registered nurses in the US of up to one million by 2020.

The authors highlight an observational study of 15,000 elderly patients in intensive care units in 31 hospitals, which compared hospital profitability, magnet accreditation, organisational climate and nursing overtime with a number of patient outcomes related to the quality of nursing care.¹ These included central-line associated blood stream infection (CLBSI), ventilator acquired pneumonia, catheter-associated urinary tract infection (CAUTI), decubitus ulcer rates and 30 day mortality.

Although lower profit hospitals demonstrated fewer adverse outcomes, hospitals with Magnet accreditation, previously shown to promote positive patient outcomes, demonstrated no influence on outcome in this study. Results from the organisational climate survey were mixed – a positive organisational climate led to a slightly higher risk of developing a CLBSI but patients were 39% less likely to develop CAUTI.

However, nursing staff levels and overtime worked by nurses were consistently found to worsen patient safety outcomes.¹ Notably, the authors made no mention of any risk adjustment between the 31 hospitals studied, which means these results may be skewed by baseline health differences in their patient populations.

Similarly, the authors quoted another study² that found critical care nurses who worked more than 12.5 consecutive hours demonstrated three-fold increased risk in medical error (mostly medication related). Within the same cohort, 65% reported difficulty keeping awake and 20% said they fell asleep at least once during the 28 day study.

The authors conclude that in view of these findings and the chronic/worsening global nursing shortage, there are no easy solutions. However, they encourage further nurse involvement in advocacy and research to further inform public policy and subsequently improve patient outcomes.

Take home message: The link between good working conditions for nurses and safer patient care is not yet clear. Contradictions in some of the findings and a lack of risk adjustment between the organisations and patient populations studied means that further research is required to clarify this link. Furthermore, the results cannot be generalised to the Australian context, and thus it will be important to undertake studies in this country.

1 Stone PW, Mooney-Kane C, Larson EL, et al. Nurse working conditions and patient safety outcomes. *Med Care*.2007; 45(6):571–578.

2 Rogers AE, Hwang WT, Scott LD, Aiken LH, Dinges DF. The working hours of hospital staff nurses and patient safety. *Health Aff (Millwood)*. 2004; 23(4):202–212.

Provision of significant new data to research participants

Peppercorn J, Buss WG, Frost N, Godley PA. The dilemma of data-safety monitoring: provision of significant new data to research participants. The Lancet 2008; 371: 527-529.

There is no argument that participants in research trials must be fully informed and provide written consent before entry into the study. However, this viewpoint paper highlights difficult ethical issues that need to be considered when new information comes to light during the actual study process, in particular bringing to attention the lack of consensus around delivery and adequacy of information provided to participants after enrolment.

The authors use a large randomised double blinded controlled trial of finasteride, an oral 5- α reductase inhibitor and placebo for prostate cancer prevention¹ as a case study. Interim analyses for patients completing 7 years of therapy demonstrated significant benefit for finasteride in meeting the primary endpoint but at the same time found an unanticipated absolute increase in incidence of high-grade prostatic cancer in finasteride recipients.

Whilst there were concerns about the safety of finasteride, in the absence of sufficient scientific information, the trial continued until a second interim analysis provided more conclusive evidence to support the initial findings.

The authors discuss the issues of individual right to know versus the greater good of the community (and potentially the participants themselves) from delaying trial cessation until definitive evidence is obtained.

1. Thompson IM, Goodman PJ, Tangen CM et al. The influence of finasteride on the development of prostate cancer. *N Engl J Med*. 2003;349:215-24

The authors offer a number of practical suggestions to improve existing consent and information systems including:

- Clarification of the role of the data monitoring committee;
- Development of a consultative process that allows the data monitoring group to take advice from other experts when there is disagreement;
- Policies that “clearly err on the side of sharing new information with research participants, consistent with respect for the autonomy of such individuals”;
- Further discussion as to the information that should be provided to participants in the informed consent process about the role of the data monitoring group.

Of interest, the authors also note that there were no rules at the outset for stopping the trial based on interim analysis. However, they fail to consider the constitution of data monitoring committees, in particular the role of consumers.

Take home message: There is no simple answer to the question of what information should be given to research participants during the course of a clinical trial. Existing consent and information systems can be improved in a number of ways. More discussion is required on the role and composition of data and safety monitoring committees.

Using ‘lean thinking’ to redesign hospital care

Ben-Tovim DI, Bassham JE, Bennett DM, Dougherty ML, Martin MA, O’Neill SJ, Sincok JL, Szwarcbord MG. Redesigning care at the Flinders Medical Centre: clinical process redesign using “lean thinking”. MJA 2008; 188(6):S27-31.

With increasing demand on services for healthcare alongside continued budgetary constraint, hospitals have an obligation to review how they organise and manage their delivery of care without compromising safety or quality.

This article describes how Flinders Medical Centre (FMC) in Adelaide redesigned their clinical processes to manage increasing congestion in the emergency department (ED), through an approach known as “lean thinking”.

An aggregated root-cause analysis had indicated major problems in capacity to provide safe care in the ED and other areas of the hospital. Upon suggestion by the United Kingdom’s National Health System Modernisation Agency, “lean thinking” was adapted as an effective improvement strategy, following successful process redesign at the Toyota Motor Corporation. To ensure acceptance and successful implementation throughout the hospital, a dedicated Redesigning Care team was established in 2003, with governance by a reference group of the hospital’s management executive, and assistance from Australian and international experts including Lean Enterprise Australia¹.

The aim of Redesigning Care is to eliminate duplication and delays, and to redesign patient flow, so that each step adds value and improves outcomes for patients and staff.

Staff training with a focus on the patient journey, identification of “short” and “long” care patients with appropriate staff and ward allocation, and standardization of processes such as medication storage and ward rounds, have resulted in positive outcomes.

Results: Data analysis since the implementation of ‘lean thinking’ has shown a capacity to manage a 50% increase in demand without changes to space or staff-patient ratios, stabilisation of

staffing, marked reduction in serious adverse events, and reduced length of stay for medical patients admitted via the ED.

Take home message: Access block was not significantly improved following the redesign. Clinical process redesign may lead to sustainable improvements in patient flow, without requiring additional resources and without compromising quality or safety in the provision of care. Successful implementation within an environment of increasing demand relies on the collaboration between all levels of the health care team.

Need for data on indigenous child health

Fremantle E, Zurynski YA, Mahajan D, D’Antoine H, Elliott EJ. Indigenous child health: urgent need for improved data to underpin better health outcomes. MJA 2008; 188 (10): 588-591.

Disparities in health outcomes between indigenous and non-indigenous Australians have been documented extensively; closing the gap was identified by the newly-formed National Health and Hospitals Reform Commission as one of the critical challenges facing the health system.¹

Child health is an important target for improvement initiatives for several reasons: 40% of the indigenous population is under 14 years of age (more than twice the proportion in the total population); many adult diseases originate in childhood so initiatives can have long-term effects; and several indicators of child health are important in themselves. To monitor the status of indigenous child health and evaluate interventions, accurate data are required.

The authors sought to identify national, or nationally representative, data on indigenous child health outcomes published in or after 2000, and to evaluate their usefulness. They found 15 national population health data collections that included indigenous status and age; 6 national collections or reports specific to indigenous health; and 12 specific to children. The only data specific to indigenous child health were 3 state-based collections.

All the collections had significant limitations. Reporting of indigenous status is unreliable in many collections. There are no ongoing national data collections specific to indigenous child health. Indigenous people are often under-represented in data collections, which include only limited data from the services they are most likely to access. Sampling issues and lack of timeliness limit targeted collections. There are few or no data on conditions that are more prevalent in indigenous children, such as ear infection (potentially leading to hearing loss) and rheumatic fever. Finally, there is a lack of a coordinated national approach to data collection, with differences in reporting methods, data sources and data quality.

The authors highlight a number of initiatives that are already underway to improve the quality and usefulness of indigenous health data, including increasing the accuracy of indigenous identification and widening the coverage. They suggest establishing a standardised minimum dataset of child health indicators, collected through state-based networks and collated at national level. They also highlight the role of data linkage in broadening the information base.

1 National Health and Hospitals Reform Commission. Beyond the Blame Game: Accountability and performance benchmarks for the next Australian Health Care Agreements. April 2008. Available at: <http://www.nhhrc.org.au/internet/nhhrc/publishing.nsf/Content/commission-1lp>

1 Lean Enterprise Australia <http://www.lean.org.au> (accessed May 2008)

Take home message: Accurate, relevant and timely national data on indigenous child health are currently lacking. Such data are essential to inform, monitor, and evaluate strategies to improve health outcomes and reduce disparities between indigenous and non-indigenous children.

Paediatric nurse staffing and quality of care



Stratton KM. Pediatric nurse staffing and quality of care in the hospital setting. *J Nurs Care Qual* 2008; 3(2): 105-114.

A number of studies have demonstrated inverse relationships between nurse staffing and adverse patient outcomes in adults.^{1,2} It is not known whether paediatric nurse staffing influences outcomes in children, or which outcomes are sensitive to nursing care quality.³

This study used administrative data from 7 academic children's hospitals in the USA to investigate the relationship between nurse staffing and adverse patient events. Hospitals were selected on the basis of their similarity of patient populations and organisational structure

Predictor variables were: total hours of care per patient day; staff mix (registered nurses (RNs), licensed practical nurses and unlicensed assistive personnel); total overtime hours of care; and total hours of care provided by "float" or agency nurses. Outcome variables, measured as rates per 1000 patient days, were medication administration errors, parent/family complaints, intravenous infiltrates, central line infections and bloodstream infections.

Results: Staff mix (a lower proportion of hours of care delivered by RNs vs non-RNs, mainly unlicensed personnel) and a higher proportion of care provided by float/agency nurses were strongly associated with increased incidence of central line and bloodstream infections. A higher percentage of overtime hours of care was associated with lower incidence of bloodstream infections and of parent/family complaints. No association was found between staffing variables and either medication errors or intravenous infiltrates.

1 Lankshear AJ, Sheldon TA, Maynard A. Nurse staffing and healthcare outcomes: a systematic review of the international research evidence. *ANS Adv Nurs Sci* 2005;28(2):163-74.

2 Tourangeau AE, Cranley LA, Jeffs L. Impact of nursing on hospital patient mortality: a focused review and related policy implication. *Qual Saf Health Care* 2006;15(1):4-8.

3 Nursing-Sensitive Indicators for Children's Hospital Care Quality. Paediatric Data Quality Systems (Pedi-QS) Collaborative, 2007. (Accessed June, 2008, at <http://www.pediqs.com/nursingindicators.html>.)

Although hospitals had similar policies and procedures for reporting and documenting these outcomes, the authors found a lack of standardised data collection techniques and definitions. A further limitation to the study was that no risk adjustment was made; however the selection criteria were designed to overcome this limitation and data analysis controlled for unit type.

Take home message: This study provides additional data, and the first in paediatrics, on associations between nurse staffing and patient outcomes. Its findings suggest avenues for future research, and testing of indicators. In particular, studies such as this require replication in the Australian context.

Quality of care in safety-net and non-safety-net hospitals

Werner RM., Goldman LE., Dudley RA. Comparison of change in quality of care between safety-net and non-safety-net hospitals. *JAMA* 2008; 299(18): 2180-7.

The investigators explore an important question about the impact of public reporting and incentive programs on stimulating and improving the quality of care in hospitals. The issue addressed in this study is whether incentive programs have a perverse effect, specifically whether incentive programs widen the existing disparities between hospitals.

The investigators used a longitudinal study design set in the USA for the period 2004 to 2006 to examine if there were any changes in quality of care in three groups of hospitals. The hospitals (3665 in the final analysis) were divided according to the percentage of Medicaid patients treated per annum. The hospitals that treated the most Medicaid patients (i.e., poor and under-served patients) were designated as having the lower quality of care. Medicaid patients constituted 40% of all patients treated in these hospitals; in contrast the 'high quality of care' hospitals only had 5% of patients under Medicaid.

The hospitals' performance was examined across two time periods, 2004-05 and 2005-06, using ten processes of care measures for three clinical conditions (acute myocardial infarction, heart failure and pneumonia). The hospitals with the highest percentage of Medicaid patients had lower performance scores at baseline and the smallest gain in performance over the study period.

The investigators applied a simulation model for financial bonuses using an existing pay-for-performance demonstration system. The modelling indicated that the hospitals with the highest percentage of Medicaid patients would have received smaller bonus payments and were more likely to incur penalties. This supported the investigators' hypothesis that an incentive program may widen existing disparities among hospitals. The unintended consequence of this is potential deleterious effects on services that provide for vulnerable groups.

This is a methodologically and conceptually complex study with significant limitations. The limitations and assumptions are addressed by the investigators around the key issues of designating hospitals into high and low performing groups, the selection and use of the performance measures and the simulation model.

Take home message: In spite of its limitations this is an important study as it demonstrates the potential for perverse and unintended consequences in incentive schemes designed to improve care. This question requires more research especially as political and economic imperatives continue to drive policy in health care.

Quality Measurement and Data Linkage

To use quality indicators effectively to assess care, high quality data sources are required that include information on patients' conditions, treatments and providers. These data must be collected and reported in a way that validly represents the operations of the health service to highlight areas in need of improvement. Data must also be risk-adjusted in a way that allows for valid comparisons across wards, hospitals and health services.

Performance measurement based on administrative data, collected for financial or insurance purposes, is being used more regularly internationally, due to the time and cost-effectiveness of utilising existing data. Despite the widespread use of such data, the scientific rigour of quality measurement based on administrative data has been questioned in the past.¹ The reservations mainly relate to a lack of clinical accuracy, inadequate clinical detail to enable robust risk-adjustment models, incomplete coding, and coding inconsistencies (ICD codes) across states or institutions. All of these factors can obscure the findings of quality measurement, leading to an inaccurate picture of the actual quality of care provided in an organization.

One proposal for improving quality reporting based on administrative data is to supplement them with other data, such as those from existing clinical registries.² Clinical registries are prospective, observational databases that are primarily developed for research into specific clinical or disease areas. Registries generally have a greater level of clinical detail, which can enhance the accuracy of risk-adjustment models to allow for more accurate comparisons between outcomes.³ Additionally, the clinical focus of these registries may increase the acceptance of reports based on their data by other clinicians.

Data linkage is a methodology used to combine data-sets to create more comprehensive information sources.⁴ Data linkage provides a cost- and time-effective means of broadening the scope of data and enhancing the completeness of existing information. As technologies advance, data linkage software is more readily available and studies involving data linkage are becoming more common in many areas of healthcare and medical research.

In health care evaluation, data linkage is a promising tool that can enable researchers to measure care across sectors, assess the integration of care, consider long-term patient outcomes, monitor service provision, identify adverse outcomes and compare data obtained from different sectors or agencies.⁵ In Western Australia, the WA Data Linkage Unit (<http://www.datalinkage-wa.org.au/>) has enabled the linkage of multiple healthcare data-sets, which has facilitated various studies to evaluate health services. Examples include research into the long-term survival rates of intensive care patients,⁶ the risk of suicide in psychiatric patients during and after hospitalisation,⁷ studies of adverse drug reactions in the elderly,⁸ and the Quality of Surgical Care Project.⁹

Data linkage has the potential to generate valuable information and improve data accuracy by comparing shared variables across data-sets. Registry and database administrators should consider the potential for linking data-sets during initial database design, so that the linkage process can take place in a rigorous way using stable and unique identifiers. Data linkage that uses incomplete or non-unique variables can lead to additional concerns about error. Previous studies have found that linkage errors can be non-random. Some records may be excluded prior to the linkage process due to incomplete data, and these exclusions may also be non-random. The accuracy of data linkage has been shown to vary by participants' years of education,¹⁰ age and race.¹¹ Additionally, different data linkage operators¹² and software¹³ have also produced differing results. Therefore, when collecting data and conducting research using linked data, it is important that potential linking variables are collected, the completeness and accuracy of data sources are evaluated, and the data linkage process be conducted in a systematic way.

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