Australian Patient Safety Bulletin

Newsletter of the NHMRC Centre of Research Excellence in Patient Safety

February 2008 Issue 8

Centre of Research Excellence in Patient Safety

Upcoming Seminars

Public reporting of healthcare data

Date: Friday, 23 May 2008

Venue: Ella Latham Theatre, Royal Children's Hospital Melbourne, Victoria

The public reporting of healthcare data is commonplace in other countries, including both the US and the UK. In these countries, league tables rank the performance of hospitals and individual clinicians. In Australia, we have headed down this path - or is it a slippery slope? In this seminar we will address the following questions:

- What difference has public reporting made to quality in hospitals and to consumer confidence?
- Is this the path that we want to, or indeed should, take?
- What are its effects on providers?
- How do we take this forward and what are the barriers?

In this seminar you will hear a range of views on this provoking subject. Put this date in your diary. Further details will be available on the Centre of Research Excellence in Patient Safety website at <http://www.crepatientsafety.org.au/>

2008 Silagy Seminar

Monash Institute of Health Services Research and Southern Health are pleased to announce that the 2008 Silagy Seminar will be delivered by Prof Chris Baggoley, Chief Executive of the Australian Commission on Safety and Quality in Health Care.

Prof Baggoley will speak on the topic: "*Research to make our hospitals safer and better: the priorities of the Australian Commission in Safety and Quality in Health Care".*

Date: Tuesday 15 April 2008

Time: 12:30 pm, preceded by a light lunch from 12 noon.

Venue: Main Lecture Theatre,
Monash Medical Centre
Clayton Road, Clayton 3168

The Silagy Seminar is presented as a keynote address as part of Southern Health's Research Week celebration, acknowledging research conducted at Australia's largest public hospital network. Other keynote addresses will include:

Wednesday 16 April: *'Understanding, maintaining and using human embryonic stem cells*.' Prof Martin Pera, Director, Stem Cell and Regenerative Medicine,

Thursday 17 April: David de Kretser Lecture: *Clear thinking versus wishful thinking*. Dr Alan Finkel, Chancellor, Monash University.

Where: Monash Medical Centre
When: MMC Clayton, following a 12 - 12.30 pm. lunch.

In this issue

The CRE in Patient Safety is funded by the Australian Commission on Safety and Quality in Healthcare and designated as a NHMRC Centre of Research Excellence. The CRE is based in the Department of Epidemiology & Preventive Medicine, Monash University, Alfred Hospital.

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).

Six year audit of cardiac arrests and medical emergency team calls in an Australian hospital

Buist M, Harrison J, Abaloz E, Van Dyke S. Six year audit of cardiac arrests and medical emergency team calls in an Australian outer metropolitan teaching hospital. BMJ 2007; 335: 1210-2.

In-hospital cardiac arrest can indicate sub-optimal patient management and rapid treatment may increase patients' chances of survival. Medical emergency teams (MET), also called rapid response teams, are multi-disciplinary teams consisting of emergency and critical care clinicians who are on-call continuously to evaluate and treat rapidly deteriorating patients. The use of these teams is thought to reduce the number of in-hospital cardiac arrests and unexpected patient deaths, as they are able to reduce the amount of time in which appropriate treatment is provided. However, a recent cluster-randomized controlled trial study (MERIT study) found that a composite measure of cardiac arrest, unexpected death and unplanned ICU admission was not reduced; the authors suggested this may be due in part to inconsistent use of MET calls in the intervention hospitals.

The aim of this study was to assess the effects of an orientation program for interns, and professional development programs for medical registrars and intensive care liaisons on the number of MET calls and incidence of cardiac arrest within one Australian hospital from 2000 to 2005.

Results: Over the six year study period, the number of MET calls increased by 46% (213 in 2000 to 311 in 2005) and the incidence of cardiac arrests reduced from 2.4 per 1000 admissions to 0.66 per 1000 admissions. However, a noted limitation of the study is that other factors that may have contributed to the reduction of in-hospital cardiac arrests were not measured.

Take home message: Medical emergency teams may reduce the number of unexpected deaths and in-hospital cardiac arrests if they are consistently used when certain criteria are met. However, consideration should be given to including educational interventions with the implementation of medical emergency teams to ensure that barriers to calling for assistance can be overcome

Toward higher- performance health systems: Adults' health care experiences in seven countries

Schoen C, Osborn R, Doty MM, Bishop M, Peugh J, Murukutla N. Toward Higher- Performance Health Systems: Adults' Health Care Experiences in Seven Countries, 2007. Health Affairs 2007; 26 (6): w717-w734.

This 2007 Commonwealth Fund International Health Policy survey compares adults' health care experiences in Australia, Canada, Germany, the Netherlands, New Zealand, The United Kingdom and the United States. The seven countries in this survey represent diverse insurance systems and vary in the extent to which primary care plays a formal role in delivery systems.

The telephone survey consisted of interviews with a representative sample of adults age 18 and older. Interviews were conducted with 1,000 adults in Australia and New Zealand, 1,500 in Germany, the Netherlands, and the United Kingdom; 2,500 in the United States; and 3,000 in Canada.

Results: This study found major variation across countries in the extent to which care is accessible, patient-centred, safe, and efficient, but also areas of shared concern. Patients' experiences underscore the importance of attention to insurance design as well as the organization of care to improve performance.

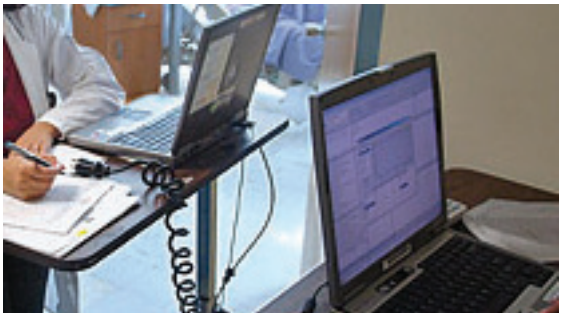
The Dutch public stands out for its positive views, including high levels of confidence in quality and accessibility of care and low levels of cost-related concerns. In contrast the United States held the most negative views and were the most likely to report affordability concerns. Public views in Canada and New Zealand have grown steadily more positive in the past decade and are comparable to views in Australia and the United Kingdom. Germans rank just behind the Americans in negative system views.

There were marked differences across countries in waiting times for those needing elective surgery. German and US participants reported the most rapid access and Canadian and British participants, the longest waits.

Cross country comparison indicates that fragmented coverage makes it difficult to address these systemic concerns. In all countries the study finds that having a 'medical home' – a primary care source that knows their medical history, is accessible and helps coordinate care – is associated with significantly more positive patient experiences, including more responsive and efficient care and lower rates of patient-reported errors. However, such medical home connections are not system-wide in any country.

Take home message: Countries face the shared challenge of how to integrate care in an era of specialisation and shortages of primary care physicians. Ageing populations and medical science advances will require workforce as well as systems innovations to improve health and meet population needs. Developing 'medical-home' approaches offers the potential to move toward higher performance.

Emergency physicians' perceptions of health information exchange



Shapiro JS, Kannry J, Kushniruk AW, Kuperman G. Emergency physicians' perceptions of health information exchange. J Am Med Inform Ass 2007; 14(6): 700-705.

This article discusses the perceived current state and need for improved Health Information Exchange (HIE) by emergency physicians in New York City. An increase in emergency presentations coupled with a decrease in the number of emergency departments (EDs) across the United States has resulted in ED "crisis".

The authors propose that many of the resulting safety and quality problems are due in part to poor provider access to important patient level information at the point of patient care. These "information gaps" have been suggested to occur due to patient migration among providers, as well as a general fragmentation of the overall health system in the USA.

This study aimed to investigate the current state of awareness among emergency physicians of HIE and their perceived need for improved access to external patient information as well as the possible barriers to its implementation. In addition, the authors were able to investigate what emergency physicians saw as being the most desirable data elements in HIE systems.

A questionnaire was developed and pilot tested before being administered to 371 emergency physicians in 12 New York City hospitals via a web based system. In total, 216 physicians responded (58% response rate).

Results: Of those, 86% felt that it was currently very difficult to gain patient information from external sources, while 39% believed that half of their patients would benefit from such information. Ninety-seven percent felt that the delivery of care would improve with greater HIE and that these benefits would be to the department (92%), the hospital (91%) and the total healthcare system (98%). Sixty-four percent believed that medical errors would decrease and that overall hospital costs would also decline as a result of HIE systems. Of note, 76% of respondents had never heard of HIE and 54% thought the improved information access may be likely to increase time to disposition from the ED. The data elements that would be of most use in an emergency department HIE system were reported as electrocardiogram (80%), discharge summaries (66%), medication lists (65%) and laboratory results/ radiology reports/ patient problem lists **(**59%).

Take home message: The use of HIE to improve provider access to a network of patient level information is perceived by clinicians in EDs as a useful and beneficial adjunct to current clinical care.

While this study is only generalisable to the ED community, further tailoring of the specific data elements for other specialities would streamline the information systems needed to deliver important clinical information in a timely fashion to those who need it.

Medical errors involving trainees: A study of closed malpractice claims from 5 insurers

Singh HS, Thomas EJ, Petersen LA, Studdert DM. Medical errors involving trainees: a study of closed malpractice claims from 5 insurers. Arch Intern Med 2007; 167(19): 2030-6.

Aside from some investigation within the arena of clinical handover, trainee error remains a relatively unstudied topic. Although the scrutiny of malpractice claims has limitations relating to factors such as hindsight bias they do provide the ability for multiple and multidisciplinary reviewers to interrogate a rich data source, which can be triangulated against other available information. This article describes a study that sought to describe the characteristics of and factors contributing to trainee errors, which were judged to have had an important role in harmful errors. It was undertaken on 1,452 malpractice claims from the period 1984 to 2004. The authors focused on four clinical categories: (1) obstetric, (2) surgical, (3) missed and delayed diagnoses, and (4) medication. These categories account for 80% of all US medical malpractice claims.

Results: The results showed that 27% of claims (with both error and injury) involved trainees whose role in the error was judged to be at least moderately important. Eight contributory factors were significantly more prevalent among trainee cases than non-trainee cases. These included, most notably, lack of technical competence, lack of supervision, handover problems and excessive workload. In addition, teamwork factors – including communication breakdowns, supervision problems, handover problems, failures to establish clear lines of responsibility, and conflict among clinical staff – contributed to 70% of trainee errors; more than twice the frequency with which they contributed to errors in the non-trainee cases. In summary, the causal characteristics detected in this malpractice claims data suggest special vulnerabilities around teamwork, multiple levels of supervision, and diagnostic decision making within trainee cases.

The authors conclude that training interventions should be designed to focus on these areas and that further research is needed into why and how trainee errors occur in order to promote patient safety.

Take home message: The development of teamwork and other specific communication skills remains universally underdeveloped in medical training. Moreover, a lack of appropriate training in the leadership skills surrounding the supervision of trainees is often neglected, meaning that appropriate patient escalation and handover processes are compromised. Ensuring education of such 'non-technical' skills for both trainees and experienced practitioners should be a higher priority across healthcare.

Patterns of technical error among surgical malpractice claims. An analysis of strategies to prevent injury to surgical patients.

Regenbogan SE, Greenberg CC, Studdert DM, Lipsitz SR, Zinner MJ, Gawande AA. Patterns of technical error among surgical malpractice claims. An analysis of strategies to prevent injury to surgical patients. Anal Surg 2007; 246(5): 705-710.

Between one-half and two-thirds of hospital adverse events are attributable to surgical care. The majority of surgical adverse events involve technical errors, but little is known about the nature and causes of these events. The aim of this study was to identify the most prevalent patterns of technical errors in surgery, and evaluate commonly recommended interventions in light of these patterns.

A random sample of American surgical malpractice claims, closed between 1986 and 2004, from insurance companies in three American regions were reviewed. The primary review identified type of error/s that were involved in the case. Errors classed as technical (defined as direct manual errors, or judgement/knowledge errors leading to performance of an inappropriate, inadequate, or untimely procedure) were subjected to secondary review to evaluate contributing factors.

Results: The investigators identified 140 discrete technical errors in 133 cases; 65% of the technical errors were linked to manual error, 9% to errors in judgement, and 26% to both manual and judgement error. Around half (49%) of technical errors resulted in permanent disability, and 16% in death. The majority of errors (73%) involved experienced surgeons and occurred during routine operations (84%) rather than advanced procedures requiring special training. Inexperience of the surgeon or poor supervision of residents were implicated in a minority of errors (14% and 9% respectively).

Complicating factors were identified in 69% of errors. Patient related factors were involved in 61%, and included difficult or unusual anatomy (25%), re-operation (20%), urgent or emergency operations (17%) and medical co-morbidity (6%). Human or system factors were identified in 21% of errors; these were mainly equipment-use problems (16%), with ambiguity of responsibility and hand off of care each occurring in 4% of errors.

Take home message: Most technical errors in surgery occur during routine operation by experienced surgeons, involving patients of greater complexity or systems failure. Provision of additional training for inexperienced surgeons or more supervision of trainees is unlikely to have a significant impact on error rates. Rather, the focus should be on improving decision making in circumstances that increase the risk of surgery, and design of better systems.

Medication administration discrepancies persist despite electronic ordering

Fitzhenry F, Peterson JF, Arrieta M, Waitman LR, Schildcrout JS, Miller RA. Medication administration discrepancies persist despite electronic ordering. J Am Med Inform Assoc. 2007; 14(6): 756-764.

Electronic medication ordering systems, also known as Computerised Provider Order Entry Systems (CPOE) have been developed to reduce inpatient medication errors. While these systems allow rapid delivery of legible orders to the pharmacy, and are able to generate alerts for improper dosages, allergies and drug interaction, they do not prevent administration errors. This US study, based at the Vanderbilt University Hospital in Nashville, assessed the extent to which CPOE-generated medication orders corresponded to actual administration dose and time, for the period 1999-2003.

CPOE-generated medication orders for 190 adults were reviewed and compared with the patient's paper chart records of actual medication administration details. Eligible adults were those admitted to the hospital during the study period, and who were prescribed at least one of six commonly used medications. Outcomes measured were: dose omission, unauthorised dose, wrong dose, medication dose schedule shifting, and time from first scheduled to actual first dose.

Results: Overall it was found that one or more medication administration errors occurred for 54.3% of CPOE-generated medication orders. Forty three percent of these errors were timing discrepancies, though this figure was reduced to 16.9% if dose schedule shifting was excluded. Omission errors occurred for 5.2% of 6018 dose opportunities, six incorrect doses were given (0.1% of dose opportunities), and 40 unexpected additional administrations were given (0.7% of dose opportunities). The median time between scheduled and actual first dose administration was 27 minutes, and dose schedule shifting of more than 60 minutes occurred for 10.7% of medications ordered with regularly spaced administration intervals.

It is concluded that medication administration errors persist despite the introduction of CPOE systems. To reduce administration timing errors it is suggested that CPOE orders clearly convey physician intended start times, that CPOE systems are able to alert users to duplicate medication orders, that CPOE systems do not allow physicians to order large composite doses of medication that is intended to be used as 'split doses', and that CPOE and pharmacy systems should accommodate the variety of administration schedules used in different hospital units.

Take home message: While electronic medication ordering systems, such as the Computerised Provider Order Entry Systems (CPOE) reduce prescribing errors, they do not prevent administration errors.

To reduce administration dose and timing errors CPOE systems need to convey clearly intended first dose times, detect duplicate medication orders, prevent the ordering of large composite doses, and allow for a variety of dose schedules.

Quality measurement from the patient's perspective

Elwyn G, Buetow S, Hibbard J, Winseng M. Respecting the subjective: quality measurement from the patient's perspective. BMJ 2007; 335: 1021-1022

This is the third article in a series published by the BMJ looking at use of performance indicators and focuses on measuring quality from the patient's perspective. Although the article does not present any new information it is a succinct summary of the current state of knowledge, and highlights emerging issues to be addressed in the future. The authors present their comments under six key headings or questions:

1. What do patients want?
2. Is what patients say they want the same as good quality care?
3. How does the UK compare with other countries?
4. How do we measure these quality issues?;
5. Role of patients in assessing individual doctors.
6. What happens if you pay doctors against patients' scores?

The authors conclude that patient involvement and engagement are central to achieving good outcomes, but patients have difficulty in judging whether their assumptions about quality of care are met. Meeting patients' expectations is necessary but not sufficient for high quality care.

Take home message: The subjective patient experience is of increasing importance. The approaches to measurement should be more robust and how the information from measurement should be used requires further exploration and research.

Wireless handheld computers: An evaluation by clinicians

Hauser SE, Demner-Fushman D, Jacobs JL, Humphrey SM, Ford G, Thoma GR. Using wireless handheld computers to seek information at the point of care: an evaluation by clinicians. J Am Med Inform Assoc 2007; 14: 807-15

Handheld Computers (HHC) are used on a daily basis by almost half of America's internal medicine physicians, due to their belief that the accompanying access to on-line evidence-based information facilitates improved decision making resulting in safer patient care.

This prospective cohort study set out to evaluate the desired effectiveness of the MD on Tap, an application for HCC for on-line retrieval of evidence-based information in the clinical setting, and the role of MEDLINE® in answering clinical queries at the time and point of care.

Participants were resident doctors in internal medicine, engaged in teaching rounds, in the Intensive Care Units (ICUs) and general medical wards of two community teaching hospitals associated with the University of Hawaii's Medical School. Five independent experienced physicians were recruited as evaluators. They accompanied different teaching rounds, over a six month period, recording various clinical scenarios, accompanying clinical questions and MEDLINE® citations obtained in response to the queries. These reports were then reviewed by an experienced medical librarian for relevance of the MEDLINE® citation that was used to answer the clinical query.

Results: The five evaluators recorded 228 clinical scenarios with 363 clinical questions. Relevant MEDLINE® citations were retrieved for 68% of the questions, within an average of fewer than four minutes per scenario, excluding the unmeasured time taken to enter the first query and view and sort the resultant citations.

Approximately 800 queries, comprising a combination of terms, features and limits were executed, of which 35% were successful. This supports the requirement for users to be well trained in performing well constructed appropriate searches.

Although the researchers felt that access to MEDLINE at the point of care with an HHC was useful in most scenarios, this was not so in the ICU due to the need for rapid responses throughout a constantly changing clinical situation in that setting.

Take home message: Well designed HHCs can assist with providing trained users on-line information to address clinical questions, encouraging evidence-based practice. Previous studies support usage of such devices with antibiotic prescribing[1] and calculation of medication dosages[2].

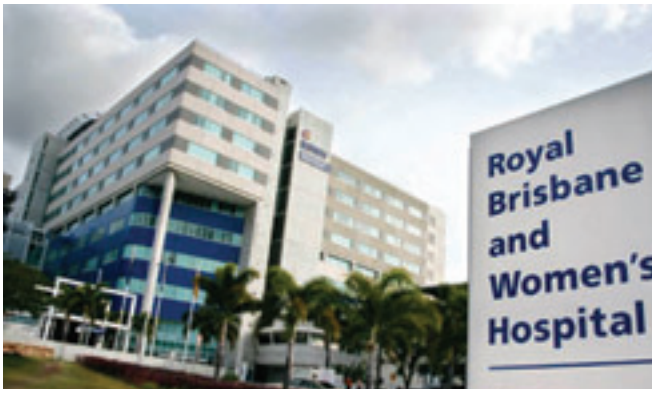
Further research is still needed to ascertain whether use in the clinical setting actually improves patient outcomes when simultaneously used at the point of care.

References

1 Sintchenko V, Iredell JR, Gilbert GL, Coiera E. Handheld computer-based decision support reduces patient length of stay and antibiotic prescribing in critical care. J Am Med Inform Assoc. 2005;12(4):398–402.

2 Greenfield S. Medication error reduction and the use of PDA technology. J Nurs Educ 2007;46(3):127–31.

Identifying variations in quality of care in Queensland hospitals



Duckett SJ, Coory M. Sketcher-Baker K. Identifying variations in quality of care in Queensland hospitals. Med J Aust 2007; 187: 571-575

In this article Duckett et al discuss a technique used to monitor quality of care in 87 of Queensland's largest public and private hospitals, accounting for 83% of all hospital activity.

Thirty one clinical indicators are collected using hospital admitted episode data obtained from medical records. These 31 indicators involve 17 conditions or procedures, which account for about 6% of all discharges from all Queensland public and private hospitals. They measure in-hospital mortality (n=5), complications of surgery (n=8), readmissions (n=7), excess length of stay (n=7) and maternity care (n=4).

Variable life-adjusted displays are control charts that measure on a monthly basis each hospital's performance against indicators. In the first instance the expected risk of an outcome, such as death or readmission, is calculated, adjusting for age, sex, and selected comorbidities specific to each indicator. Then, for each hospital, the observed outcome is calculated.

If a hospital has a much higher than expected outcome for the month, it is flagged. Thresholds are set so that if the outcome rate of care is 30% worse than the state average (for an indicator with a fatal outcome) internal review is undertaken. This escalates such that if the outcome of care is 50% more than that expected, an investigation is undertaken by the Area's Clinical Governance Unit and if it reaches 75% more than expected an investigation is undertaken by the Area General Manager or Chief Health Officer.

As part of the internal review, hospitals must first identify if the coding of the medical record is accurate. Then, if coding is not the issue, they must look to see if there are other patient-related factors that might account for the variation but that have not been adjusted for in the analysis (e.g. indigenous status). Hospitals required to undertake internal reviews are required to report back to Queensland Health the outcome of the investigation and strategies implemented to remediate the situation.

Results: Between 25 and 50% of hospitals had undertaken review in the previous three year period as a result of higher than expected mortality rates across each of the five indicators. Between 6 and 38% of hospitals had undertaken review as a result of identifying higher than expected complication rates.

Over the three year period, higher than expected mortality rates led to a number of central investigations. Aside from identifying that coding errors existed when investigation was undertaken, this article failed to explain what other changes were made and the impact that this work has had over time. It would be helpful to know what strategies were introduced.

Take home message: There is no doubt that identifying variation in practice and reasons for this have huge potential to improve quality of care. We must also consider that as much can be learned from hospitals that are doing well as from those performing badly.

It would be a little disconcerting if, after a number of years of producing these reports, hospitals still identify coding issues as the cause of variation.

Evidence that publishing patient care performance data improves quality of care

Fung CH, Lim Y-W, Mattke S, Damberg C, Shekelle PG. Systematic review: the evidence that publishing patient care performance data improves quality of care. Ann Intern Med 2008; 148: 111-23

The public release of performance data has been proposed as a mechanism for improving quality of care. Its proponents suggest it will provide more transparency and greater accountability of healthcare providers. However, potential negative consequences have been identified. The aim of this review was to synthesise the evidence for using publicly reported performance data to improve quality. Articles assessing the effects on selection of providers, quality improvement activity, clinical outcomes (effectiveness, patient safety and patient-centredness) or unintended outcomes, were considered for inclusion.

Results: Forty-five articles published since 1986 were included in the review. Key findings were as follows.

Selection: Synthesis of data found a moderate association between public reporting and selection of health plans, and inconsistent association between reporting and selection of hospitals or individual providers.

Quality Improvement Activity: Studies suggest that public reporting stimulates quality improvement activities at hospital level, although one study found several instances in which public reporting provided disincentives for improvement. None of the included studies evaluated quality improvement activities at health plan or individual practitioner level.

Clinical Outcomes: There is mixed evidence that public reporting improves outcomes; few studies have investigated outcomes other than mortality. There is little evidence concerning other measures of patient safety or patient-centredness.

Unintended Consequences: Several studies found an association between public reporting and decreased access to care for higher-risk or more severely ill patients. In surveys, surgeons reported a reluctance to operate on such patients.

Take home message: Studies of the effect of public reporting on outcomes provide mixed signals. The usefulness of public reporting in improving patient safety and patient-centredness remains unknown, as few studies have assessed these outcomes. More research is required on designing and implementing reporting systems that are appropriate to their purpose, and do not produce unintended consequences.

Pay-for performance principles that promote patient-centered care: an ethics manifesto

Snyder L, Neubauer RL. Pay-for performance principles that promote patient-centered care: an ethics manifesto. Ann Intern Med 2007; 147: 792-4

Pay-for-performance – the linking of physician reimbursement or health facility funding to measures of clinical performance – is increasingly being employed as a means of improving the quality of health care. It is, however, controversial; there is little evidence of its effectiveness and the potential consequences are largely unexplored.

This position paper from the American College of Physicians (ACP) Ethics, Professionalism and Human Rights Committee explores the potential conflict between the physician's obligation to the patient and the rewards of favourable quality ratings.

Potential unintended consequences include de-selecting challenging patients, "gaming" by focusing only on aspects of care that are measured, creating distrust between patients and physicians, and increase in unnecessary care and costs. These consequences may actually lead to worse care despite measurements that imply good quality. The ACP recommends three principles in designing pay-for-performance systems that ensure accountability for professional behaviour and thus offset the adverse effects:

1. Ensure transparency, by making public their physician's performance on quality measurements and any financial incentives to which s/he is subject.
2. Measure what is important to patients. This will require development of objective measures in the quality domain of "patient-centredness", such as continuity of care, communication, respect for patient preferences and confidentiality.
3. Monitor unwanted behaviour and intervene. This will require increased administrative oversight of physicians to prevent patient de-selection or gaming, and the imposition of penalties for those who engage in these practices.

Take home message. Pay-for-performance has the potential to lead to worse care unless all facets of health are evaluated, not just those that are easily measured. To improve patient-centredness of care, we must first learn how to measure it. Incentives to increase quality must put the needs and interests of the patient first.

Medication use leading to Emergency Department visits for adverse drug events in older adults.

Budnitz DS, Shehab N, Kegler SR, Richards CL. Medication use leading to emergency department visits for adverse drug events in older adults. Ann Intern Med 2007; 147: 755-66.

Prescribing medications to older persons requires special consideration as adverse drug events (ADEs) are common in older patients causing morbidity, mortality and high economic cost burden. The objective of this study was to identify medications that were particularly associated with number of and risk for emergency department visits for ADEs in persons 65 years of age or older. The authors used three existing databases with a particular emphasis on Beers criteria medication compared with other medications.

Data was included from a representative sample of hospital emergency departments by means of The National Electronic Injury Surveillance System - Cooperative Adverse Drug Event Surveillance System, 2004-2005. In addition, both the National Ambulatory Medical Care Survey 2004 and the National Hospital Ambulatory Medical Care Survey were utilised. However, the authors were especially interested in the Beers criteria as it provided a list of medications generally considered inappropriate for elderly people as they may pose more risk than benefit.

Results: The authors estimated that over the two year period for US patients 65 and older there were about 177,000 emergency department visits for ADEs. From these ADE visits only 4% were related to drugs considered to be always potentially inappropriate according to the Beers criteria. In contrast, 33% of visits were related to three medication classes: oral anticoagulants, antidiabetic agents, and narrow therapeutic index agents. Of these three classes the three most common medications implicated were warfarin (17%), insulin (13%), and digoxin (3%). After taking into account outpatient prescribing, they estimated that the likelihood of ADE due to these three medications was 35 times greater than for medications considered to be always potentially inappropriate.

Take home message: The findings of this study show that the Beers criteria medications caused low numbers of and few risks for emergency department visits for adverse events when compared with other medications. Furthermore, the authors suggest that small improvements in the use of insulin, warfarin and digoxin would have a potential for reducing the burden of serious adverse drug events among older patients.

The importance of design and human factors in healthcare

Other high-hazard industries provide lessons for good design in health.[1] Indeed, healthcare shares many common features with these industries, such as: the primacy of safety; the presence of high technology; the need for intensive training and team-working; the necessity of keeping costs down; and the increasing burden of public litigation. However, a number of distinct differences exist, which create challenges when trying to transfer best practice lessons from other industries into healthcare. These include: the general lack of standardisation of equipment and protocols in healthcare; the fact that healthcare 'customers' are commonly more vulnerable to harm and are in direct interaction with professionals; the continued reliance on professional judgment and the cultural legitimacy of procedural 'deviation'; and the higher levels of uncertainty and variability.

All of these factors create greater residual risk and complexity. Design can play a vital safety role. The following examples – divided into devices, facilities and medicines – show the impact of good and bad design across the medical domain. They illustrate the need to understand how people, tasks and environment (or 'human factors') work in healthcare. Consideration of human factors can deliver more intuitive, efficient and, hence, safer devices, facilities and medicines.

(1) DEVICES

***Good Design**:* In the USA, Lin et al. engaged with user groups (mainly nursing staff) to identify design deficiencies of an analgesia delivery device interface.[2] Issues that arose included insufficient feedback, inconsistent control, and confusing message displays. Based on these results, key improvements to the device interface were made, including a system menu showing users their progress through the programming sequence. Follow-up analyses revealed that the redesigned interface led to both improved safety and efficiency, and lower workload.

Bad Design: An instance where suitable device requirements were needed but not successfully gathered or incorporated into the device design process occurred in the UK in 2002, when a 9-year-old boy died from asphyxiation during routine surgery.[3] It was found that death occurred because the tube delivering oxygen had become blocked after a plastic cap – routinely discarded into the same drawer where the delivery components were stored – became lodged inside the glass delivery tube as a result of continual opening and closing of said drawer. Systems-based design could have alerted designers to this potential risk.

(2) FACILITIES

Good Design: A review of 600 studies revealed that hospital design can impact clinical outcomes and patient safety, such as lower incidence of patient falls, hospital-acquired infections and medical errors.[4] Simple design interventions, such as changing the ceiling tiles around nursing stations to reduce the noise level, have been proven to assist staff effectiveness.

Bad Design: Design 'innovations' within the healthcare environment are often not developed with a system-view and have the potential to increase patient risk. For instance, the 1990s saw the advent of the universal patient room across the US; a concept that embraced the idea that a patient room could be designed to adapt to a patient's changing acuity levels. The original motivation was a good one, since this new design enabled patients to stay in one location throughout their hospitalization. Despite benefits (i.e. flexible, adaptable layout to both patient and technology needs), empirical studies have shown that the drawbacks have proved of greater influence. It was not possible, despite the best intentions of cross-training schemes, for enough nurses to be sufficiently skilled in all acuities. Thus, patients were in danger of inadequate monitoring and treatment. Latest US guidelines, consequently, point to single-bed units as a 'safer' alternative.

(3) MEDICINES

***Good Design**:* Guidance on information design in relation to outer and inner packaging for medication was created, through a process of stakeholder consultation, within the UK National Health Service.[5] Issues such as ease of identification, dosage compliance and information degradation on the 'journey of the pack' from manufacturer to patient were raised. This work highlights how a design-led approach could help to reduce the incidence of errors attributed to confusing, complex and unwieldy information design of packaging.

***Bad Design**:* A number of untimely deaths occurring in the UK were found to be associated with poor systems awareness and design regarding use of the drug, methotrexate. Patient harm resulted from confusion between methotrexate and (look-alike tablet) folic acid. Dispensing and administration errors led to drug identification, dosage and frequency of dosage errors, all linked with pack design issues. It has been postulated that if the packaging and labelling of the methotrexate tablets adequately highlighted its status as a weekly dosage medication, then patients and practitioners could have been alerted to a number of these incidents much earlier.[6]

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