Towards evidence-based quality improvement: perspectives from nursing practice

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Abstract

This paper explores how the evidence-based practice and quality improvement movements are informing our understanding of what counts as quality patient care. Implicit in the debate is that we have understood and can manage the concept of patient safety. Using a true case study, the paper will illustrate how a clearer, more integrated understanding of safety, evidence-based practice and quality improvement principles can lead to more effective care. Central to this shift is the ability to move out of traditional, professionally bound ways of thinking to new systems and new ways of providing patient-centred care. Equally, how we generate the evidence to find out how safe or otherwise health care delivery systems are, must be as important an area of investigation as the search for a new therapy or treatment for a particular disease.

Keywords: evidence-based practice, interdisciplinary care, nursing skill-mix, patient safety, quality improvement

Case study: version 1

In March 1998, a patient at a District General Hospital in southern England died following a hysterectomy. The patient bled to death after a ligature used to tie her uterine artery slipped, some hours after the operation. At the time of death, the patient was in a ward of 35 patients being cared for by only one registered nurse with two auxiliaries and a health care assistant.

Source: Evidence from RCN to House of Commons Health Select Committee Inquiry. RCN 1999 [1]

In a recent editorial in the British Medical Journal [2], Berwick and Leape chose to re-focus attention upon the need to reduce errors in medicine. They argued quite convincingly and also provided evidence to support their claim that with the rising complexity and reach of modern medicine come new and startling levels of risk and harm to patients.

Such unintended consequences are well known. Florence Nightingale’s [3] exhortation to nurses was ‘first do no harm’ and much has been written about the phenomenon of iatrogenesis popularized by Ivan Illich [4]. Yet quite simply we should all realize that there is no such thing as a perfect system. Every system is potentially prone to error. The more complex and unpredictable the system the greater the likelihood of errors arising. Somehow in the literature of quality improvement and increasingly with evidence-based practice, the common links between error reduction and system performance seem to be missing. In health care, error can arise from individuals, from inaccurate clinical judgement or intervention or systems failure. Equally, improvements can be promoted at the individual practitioner level, at the level of clinical understanding and decision making and at systems level.

Taking the case study cited above, one can begin to consider the events that led to this fatality. Was it due to an individual, clinical or systems error? Or was it a tragic, unpredictable, non-preventable accident?

Where our understanding of evidence-based practice and quality improvement principles becomes obvious is in answering the following questions. In order to reduce error and work towards more effective systems we must first of all know what to do, i.e. what is the most efficacious treatment for our patients? Next, we must be confident that those carrying out the diagnosis and treatment intervention know how to do it; who in the multi-disciplinary team is best suited to do it; and finally that the systems and processes exist to undertake it correctly.

What to do, how to do it, who should do it and whether
the systems and processes are available to do it correctly are the basis of new ways of thinking about evidence-based quality improvement.

**What to do**

Evidence-based practice (medicine, health care, nursing) has become the most recent trend to influence health care policy. Based upon epidemiological and bio-statistical principles of evaluating the efficacy and effectiveness of a clinical intervention, the evidence-based movement has had a significant impact on the way clinicians are encouraged to make decisions about patient care. Sackett *et al.* [5] describe evidence-based medicine as the ‘conscientious, explicit and judicious use of current best evidence about the care of individual patients’. Appleby *et al.* [6] acknowledge the cultural forces at work, health care provision slowly moving away from decision making based on opinion, past practice and precedent toward making more use of science, research and evidence to guide clinical decision making.

What this would mean in practice using the case example given, is that the decision to perform a hysterectomy was the best clinical decision. The diagnosis of symptoms was correct, the choice of hysterectomy correct and the surgical technique (including most effective ligature techniques) used was known to be the most effective. Equally, the risks and benefits would have been discussed with the patient so that she would have understood exactly the choices she was making.

None of these assumptions were investigated following the patient’s death. At the coroner’s inquest the expert witness, a consultant gynaecologist, said that the ward was understaffed and that more frequent observations of the patient’s pulse and blood pressure could have identified the problem earlier.

This led the investigators to pay more attention to the cause as being due to an error in judgement around the system supporting the primary medical intervention. Equally, an independent nursing consultant told the inquest that she believed that the staffing levels were too low at the time of the patient’s death. Despite these views, the coroner recorded a verdict of accidental death and did not criticize the hospital.

What evidence could the coroner have drawn upon in order to judge whether the ward was understaffed and that such understaffing put the patient in serious risk of harm? Aiken [7] has argued that every multi-hospital study on mortality in North America has demonstrated substantial variation across hospitals and has shown that nursing is amongst the most important factors that explain variation in death between hospitals. She cites several studies [8–13] that have been found to influence hospital mortality rates including the level of experience [8] and number of registered nurses [9], the ratio of registered nurses to unqualified staff [9–11] and the ratio of patients to nurses [10].

Process factors such as quality of communication between doctors and nurses particularly [13] and the way patient care was organized [9] were also identified as key factors.

Using this accumulated evidence, Aiken *et al.* [14] hypothesized that it was not just the number and skill-mix of nurses in hospitals that led to reduced mortality rates, but that hospitals which facilitated greater professional autonomy, more local control over practice and fostered better relationships between doctors and nurses would have lower mortality rates that would be statistically significant.

Using hospitals known to attract nurses (magnet hospitals) [15] because they explicitly promote a more devolved and decentralized approach, Aiken *et al.* compared mortality rates in these hospitals to matched control hospitals. The magnet hospitals had mortality rates that were 7.7% lower than matched control hospitals and, after adjusting for differences in predicted mortality rates, the magnet hospitals had 4.6% lower mortality rate.

This evidence (in the context of an evidence-based practice approach to improving patient care) suggests that we do know that there are certain situations where patients are more likely to be harmed if there is not the correct supervision, support or surveillance. The question is what do we do with this evidence?

A survey conducted by the Royal College of Nursing [16] in 55 general medical wards in NHS Trusts across the UK found the following:

- 71% of wards reported nursing vacancies with an average registered nurse vacancy rate of 12%;
- on day (early) shifts, just under half the nursing shift were registered nurses, the majority of staff were health care assistants;
- nurses felt they were often prevented from providing high quality care because of lack of staff – in particular lack of registered nurses;
- 95% of nurses in charge of the wards said that patient care was compromised by short staffing at least several times a month; 37% of wards reported patient care being compromised on most shifts;
- 96% of nurses in charge of wards said that they felt patients were put at risk at least occasionally due to short staffing. 22% said they that felt patients were often at risk.

Whilst information from this survey must be treated with some caution, it does show a trend towards workers feeling that the system is becoming unsafe. How we generate the evidence to find out how safe or otherwise health care delivery systems are must be as important an area of investigation as the search for a new therapy or treatment for a particular disease.

**How and who to do it?**

So far I have argued that we must begin to link up principles around the evidence-based practice and quality improvement movements in order to get better at eradicating errors in health care systems. The principles of evidence-based health care can be used to judge the appropriateness of nursing skill mixes as it can for clinical interventions.
Table 1 Key factors influencing hospital mortality rates as noted in the literature

<table>
<thead>
<tr>
<th>Factor</th>
<th>Reference</th>
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<tr>
<td>Qualifications</td>
<td></td>
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<tr>
<td>Experience of team</td>
<td>[8]</td>
</tr>
<tr>
<td>Increase registered nurses</td>
<td>[9]</td>
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<tr>
<td>Skill mix</td>
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<td>Ratio of RN:unqualified nurses</td>
<td>[9,10]</td>
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<tr>
<td>Ratio of patients:nurses</td>
<td>[11]</td>
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<tr>
<td>All RN staffing</td>
<td>[12]</td>
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<td>Communications</td>
<td></td>
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<td>Between doctors and nurses</td>
<td>[12]</td>
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<tr>
<td>Work method</td>
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<td>Joint doctor–nurse management</td>
<td>[13]</td>
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<td>Organization of nursing unit</td>
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<td>Decentralization</td>
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<td>Support staff</td>
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The rate and level of change in health care delivery systems is unprecedented [17]. The nature of acute hospital care has altered dramatically over the last decade in every western country. The nature of medicine and nursing has altered considerably with much crossing over of roles and responsibilities [18]. In order for these changes to be most effective (and evidence based) there is a need to think of role attribution within a systems framework rather than along traditional professional boundaries.

For example, how do we know how many expert nurses we need in any health care system? What are the system characteristics – predictability, stability, complexity, and dependency – that determine skill levels? Can we predict when systems move towards becoming more unsafe (or potentially harmful) for patients? What is our ethical and legal responsibility in terms of duty to care for people who have entrusted their lives to our care? Common sense would indicate that the level of skilled supervision and surveillance needed for residents in a nursing home would be different from the constant attention required by patients in a post-operative state or in intensive care units.

What models can we construct that help us to map out these variables and then begin to test their effect in terms of patient outcomes? Interestingly, apart from Aiken’s work and other studies cited earlier, there is a remarkable absence of evidence around the impact of organizational variables and other clinical inputs on patient outcomes. This has to be an area to be addressed more systematically in the future, and certainly one that can be informed by quality improvement studies which by their very nature are interested in systems activity.

Figure 1 The need for expert nursing as a function of patient status. The three shaded objects represent the different proportions of nursing expertise and are shaped according to where nursing expertise is most needed within any case-mix scenario. In the ‘Nursing Assistant/Carer’ column, relatively more nursing assistants can be employed in areas where the patients status is described as stable and predictable without compromising the safety or quality of care. In the ‘Registered Nurse’ column the optimum number of registered nurses (RN) is found in care areas where patient status is moving away from being unstable and unpredictable towards a stable state. However, in order to ensure safe standards, the proportion of RNs is greater than that of nursing assistants. There is still a need for expert nurses to ensure overall quality of care. In the expert column the case mix of patients is skewed toward high dependency (unstable and unpredictable) complex cases. This requires the largest proportion of expert nurses to other staff types (RN-led nursing assistants). Intensive care unit staffing levels would be an example of this. The broken line symbolizes the shift from illness to health and indicates that the health promotion role of the RN and the expert nurse need to be taken into account when considering optimizing health care and healthy living.

One way of modelling the skill mix scenario (for this example it happens to be nursing but it could equally be for the inter-disciplinary team) would be to look at the interdependence of the stability–volatility dimension of patients/systems with the need for high levels of skill and expertise. [19] Therefore, in a patient care system e.g. intensive care unit where the individual patient profile is highly volatile, unpredictable, potentially unstable with high dependency, the requisite need for expert support is high (see Figure 1). Equally, in a nursing home where residents’ need for care is relatively stable and predictable the requisite need for expert support is much less. However, this does not mean there is no need for expert nursing care: the argument is then that in order to guarantee a level of quality care, the expert nurse(s) determine the therapeutic regime of the residents and ensure adequate supervision of other carers. Such an equation would have to balance patient preferences/expectations, clinical and therapeutic needs and staff skills with
a cost–benefit analysis. This is complex work and as yet not
given the recognition or resources it requires in order to
produce more robust staffing, or skill mix scenarios.
Equally, in considering the case study it was clear that one
registered nurse (not an expert in surgical nursing or post-
operative care) was inadequate to monitor safely the post-
operative patients. Assuming that one-third of the patients
had returned from surgery on the same afternoon, and
assuming that another third were between 1–3 days post-
operative with the remainder awaiting tests, results or surgery
it would be feasible to describe the nursing skill mix re-
quirement in the following way:

(i) approximately one-third of patients on the ward \( n = 2 \) were physiologically stable (although undoubtedly
undergoing different levels of psychological stress and anxiety);
(ii) approximately one-third of patients would be class-
sified as potentially volatile i.e. those requiring fre-
quent observations immediately post-operation and
a proportion of day 1–3 post-operative patients with
physiological complications e.g. patients with other
medical conditions requiring close monitoring of
physiological and psychological states;
(iii) remainder of patients who would be moving toward
stability, requiring less monitoring and beginning to
be more independent and active.

The skill mix requirement would therefore have to take
account of the experience and technical expertise needed to
ensure that at least one expert nurse on duty per staff was
able to monitor directly category (ii) patients and ensure that
category (i) and (iii) patients were adequately supervised. In
this case one expert, at least two registered nurses with up to
three support staff (health care assistants, nursing auxiliaries)
would appear to be appropriate. Obviously, this staff com-
plement is very different to that actually present. The question
however, is not just one of safety – the tragedy that unfurled
attested to this fact – but must be around optimal recovery
rates and a closer analysis of the quality of proper, skilled,
expert nursing care and its longer term benefit to individual
patients and the economic performance of the hospital.

**The right systems and processes**

It was not possible to address the ‘who’ and ‘how’ questions
without looking at the characteristics of the overall health
care delivery system. Significant changes in the roles of nurses
are impacting on how doctors work [20]. Yet there must be
a greater understanding and acceptance of this trend if patient
care is going to be both safe and to improve health care.
Professionals need to be able to think about the way systems
work most effectively as well as be able to think critically
about clinical interventions.

Juxtaposing work systems with management systems is a
very helpful device. It will encourage the health care team to
get into discussions of first principles of work design before

![Figure 2](image-url)

**Figure 2** The Torfaen Project Management: Development of
practitioner-based toolkit. The figure illustrates the contingent
relationship between work analysis and management ap-
proaches. Using the Torfaen Primary Health Care Project
[21] as an example, several work analyses were undertaken
by the team before new ways of working could be introduced.
Thus after a role and skills audit of staff was undertaken,
there was greater understanding of the need to set up
professional and personal development systems. Equally,
one a needs assessment and population profile had been
undertaken, patient databases incorporating the new in-
formation were set up. Health needs analysis and role analysis
of members of the primary health care team led to more
awareness of and the need to develop inter-disciplinary team
working, and the workload analysis helped to identify areas
of skill deficiency in the interdisciplinary team. Local protocols
were analysed and transformed into more evidence-based
guidelines and understanding of objective setting and pri-
oritization led to a more integrated approach to strategic
planning and evaluation within the primary health care teams.

running aground on the complexities of interpersonal rel-
ationships, roles and boundaries that normally frustrate at-
ttempts to analyse management systems.

The utility of the model is illustrated in a study which
looked at how general practitioners could manage increasing
workloads within existing resources. The Torfaen Primary
Care Project [21] built on an earlier study [22] which undertook
a work system analysis. Creed examined the workload
Whilst the practice lists had remained relatively stable over
this period, the activity had increased (consultation rates by
25%, referral rates by 40%) and out of hours calls were rising
in two out of the three practices. The researchers also found
that the increased workload was not offset by delegation to
other health care professionals and there was little evidence
that the setting up of chronic disease management clinics or
skills developments of other members of the health care
team were being used more effectively (Figure 2).

Creed’s recommendation was for more effective man-
agement of the clinical time of the general practitioners, more
Towards evidence-based quality improvement

The Torfaen Project [21] team commenced work with two of the practices in 1997 and conducted an 18-month development programme where a ‘tool-kit’ was developed to help team members begin to work together more effectively. The elements of the tool-kit were:

- a skills audit of all practice staff to ascertain personal and professional development needs; and identification of existing skills that were under used;
- analysis of information flow within the practices, whether computer-based, paper-based or verbal information about patients;
- health needs assessment and skill development;
- analysis of role boundaries, identifying overlaps, gaps and areas of conflict;
- workloads – looking at what team members actually did and helping them to reflect on: whether they needed to do it; whether they could do it more effectively;
- local protocols and national guidelines – using national evidence-based guidelines as a way of developing local evidence-based guidelines;
- clinical audit – developing audit and feedback processes at practice level;
- strategic planning – encouraging all staff to shift from a reactive approach to a more informed proactive approach.

These management dimensions were introduced over a 14-month period by a local facilitator (a member of the research team who helped to set up a number of time-limited work groups). Each work group identified a clinical/operational problem where team members had an interest in improving the situation. Topics addressed in Practice A included improving the emergency appointment process, repeat prescriptions and protocol review; whereas in Practice B staff groups looked at the management of influenza vaccination and developing a new practice leaflet as well as emergency appointments and repeat prescriptions.

The improvements in terms of patient outcomes were relatively modest but the changes that had taken place in terms of system performance, teamwork, problem solving ability, networking and communication were marked. And whilst the over-riding concern of increased workload on general practitioners (GPs) had not been addressed in the way some had expected (i.e. additional GPs), the management of the workload had improved significantly because of new ways of working.

Such studies are not atypical [23]. The whole movement towards process re-engineering, the development of care pathways and protocols, care and case management all reinforce this fundamental need to engage in work analysis.

Yet what is important for this argument is the recognition that systems analysis and refinement must be related to our understanding of error reduction, quality improvement and evidence-based practice. The elements cannot be seen as mutually exclusive nor indeed as one being subordinate to another.

Conclusions

Assuming the existence of an evidence base for the intervention and recognition of the need for appropriate supervision of vulnerable patients in key stages of their hospital stay, as well as the adequate working of systems and processes in the hospital, the story of the hysterectomy patient could have ended differently.

Case study: version 2

In March 1998, a patient was scheduled for a routine hysterectomy at a District General Hospital in southern England. The patient had discussed the need for the operation with her surgeon and was satisfied this was the right course of action. She had spoken to the ward staff who talked her through the procedure so she would know how she would feel after the operation. She was also introduced to the registered nurse who would be caring for her post-operatively.

When the patient began to show signs of discomfort post-operatively she called her nurse who checked her blood pressure and pulse. The nurse detected that something was wrong and contacted the surgeon immediately. The patient was rushed back to theatre where they found that the ligature on her uterine artery had slipped.

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After this episode the patient made an excellent recovery and was discharged to go home shortly afterward.

The question is whether the inevitable potential for error that is in every system, through individual, clinical or systems error, is addressed adequately in our current activity around evidence-based practice and quality improvement initiatives. Patient safety must surely be our bottom line and rather than lay blame on individuals we must take more collective responsibility for analysing current systems and understanding our respective contributions.

Evidence indicating the link between patient mortality and nursing skill mix should be explored more rigorously and used by systems to guarantee better safety standards. Equally such debates cannot be undertaken in isolation. The effective work of nurses is contingent upon the shared understanding and role clarification of all members of the health care team. Problems of workload in one group, e.g. GPs in the Torfaen Project, were addressed by better teamwork. But for this to happen the whole team had to be involved in a process of better understanding of work systems and management systems. What is clear is that we cannot solve such problems
in professional isolation. Equally, we must recognize that the consequences of embracing a more evidence-based approach to health care will require greater investment in health services and nursing research [24].

If the patient in the case example had lived she would have been indebted to a system whose contribution had meant that even in the face of an unexpected event there were sufficient safeguards in place that she would not have harmed.

Is this the real challenge facing us – as we are expected to manage greater workloads with fewer resources? When do we know that we have made our system intrinsically unsafe and if we do have a sense of it, what can we do about it? Do our existing quality improvement systems have the capacity to tackle such challenges? Surely these are the essential questions that we must be asking in order to integrate the benefits of evidence-based practice with evidence-based quality management systems.

References


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