

# Measuring and monitoring safety: an acute care perspective

Carol Peden

---

In this thought paper paper, Dr Carol Peden offers reflections on the measurement and monitoring of safety from the perspective of a practising clinician based at a busy district general hospital. Dr Peden focuses on where patient safety work is directed within her hospital, the areas of safety that have challenged her, and the lessons she has learned trying to improve safety in an acute hospital setting.

The Health Foundation is calling for a stepwise change in thinking about patient safety. This paper forms part of a programme of work we are undertaking to help answer the question *How do we know care is safe?* We want to build on a culture that has focused almost exclusively on measuring past harm and enhance this to incorporate approaches to measurement that also establish the presence of safety.

Health Foundation thought papers present the authors' own views. We would like to thank Dr Peden for her work, which we hope will stimulate ideas, reflection and discussion.

## About the author

### **Dr Carol Peden**

Dr Carol Peden is a Consultant in Anaesthesia and Intensive Care Medicine, and Associate Medical Director for Quality Improvement, at the Royal United Hospital, Bath, UK.

She is a Health Foundation Quality Improvement Fellow and, as part of that programme, spent a year at the Institute for Healthcare Improvement (IHI) in the US.

She has led safety and quality improvement work programmes within her own hospital, regionally for the South West of England, and internationally as Faculty for IHI and as Chair of the Executive Board of Dr Foster's *Global Comparators* project.

Her research interests include improving outcomes for patients undergoing emergency surgery. She is quality improvement lead for the National Emergency Laparotomy Audit and for a major trial evaluating quality improvement techniques for high risk surgical patients.

In 2013 she was awarded the Humphry Davy medal of the Royal College of Anaesthetists.

## Introduction

In April 2013, the Health Foundation published a report by Professor Charles Vincent and colleagues – *The measurement and monitoring of safety*.<sup>1</sup> The purpose of this report was to understand what methods, tools and indicators are being used, and should be used, to measure patient safety. High-risk industries assess the presence of conditions that create safety and proactively seek out areas where harm could occur. In healthcare, at present, many organisations remain reactive, responding to harm with investigations and enquiries, some of which are very costly and prolonged.<sup>2</sup>

This paper represents reflections on the ‘framework for measurement and monitoring of safety’ proposed by Professor Vincent (see figure 1). It is written from the

perspective of a practising clinician based at the Royal United Hospital, Bath – a busy district general hospital. I have expertise and training in healthcare quality and safety, but also understand the tensions and challenges of making care safer in the imperfect world of busy clinical practice.

Professor Vincent’s report identifies three major challenges for the measurement and monitoring of safety, namely:

- to address the many technical and conceptual issues inherent in any attempt to measure safety
- to understand how safety measures can be effectively used in practice by clinical teams, boards and commissioners to monitor and improve safety
- to clearly communicate the findings to a number of different audiences.

---

**Figure 1: A framework for the measurement and monitoring of safety**



As a clinician and governance lead, my time is spent concentrating on the latter two issues. However, the first challenge occurs even during the ‘routine’ clinical measurement of safety such as that done when performing mortality reviews and harm assessments. For example, should harm (as measured with the global trigger tool<sup>3</sup>) be classed as avoidable or unavoidable, when analysed as part of a hospital safety programme? A hospital-acquired pneumonia in a frail dying 96-year-old may be the mode of death, and perhaps therefore unavoidable, however classification depends on perspective. One could ask ‘why is this patient in hospital and did this patient have an end-of-life care plan?’ If we class this pneumonia as unavoidable harm, we may fail to examine whether or not this patient died in the place of their choice. If they did not, that would surely be classed as harm from the patient’s perspective. This is just one example of the type of conceptual challenge encountered as part of a team trying to make patient care safer.

The report suggests that we can approach the framework’s dimensions of safety by asking five critical questions:

- Has patient care been safe in the past?
- Are our clinical systems and processes reliable?
- Is care safe today?
- Will care be safe in the future?
- Are we responding and improving?

I have chosen to divide this paper into these sections; my response is focused on where our patient safety work is directed, the areas

that challenge me, and the lessons I have learned trying to improve safety in an acute hospital setting.

### **Has patient care been safe in the past?**

As an organisation, we use most of the methods to measure harm discussed in Chapter 6 of the report (‘Has patient care been safe in the past? The measurement of harm’). We have a monthly clinical outcomes group comprising senior clinicians who review mortality statistics (hospital standardised mortality ratios (HSMR) and summary hospital-level mortality indicator (SHMI)). We identify diagnostic and procedural areas where alerts are occurring and investigate accordingly. Although these data are retrospective we believe trends over time are very useful. We understand the imperfect nature of these data and the impact of coding, however this high level analysis can allow us very quickly to find areas which need case note review and to understand whether further action is required.

In addition to studying our Dr Foster data we also use routine global trigger tool analysis of a random selection of notes every month, and a structured mortality review of 50 sets of notes each year from patients who have died in the hospital.<sup>4</sup> From these reviews we develop themes for improvement work. For example, a mortality review conducted in conjunction with a GP commissioning lead identified that many of the patients who die are frail, elderly and at the end of life. The reviewers felt

that while death was inevitable, there was room for improvement in communication about end-of-life care with families and the relevant community partners. Therefore, to improve our care we jointly agreed Commissioning for Quality and Innovation (CQuIn) payments to facilitate education and training in communication around this challenging topic.

Whatever methods are used to look for safety data retrospectively, we believe **triangulation** is key. No method is perfect, and therefore clinicians and boards should be reviewing data from several areas to inform themselves about the state of safety in their organisation.

### Are our clinical systems and processes reliable?

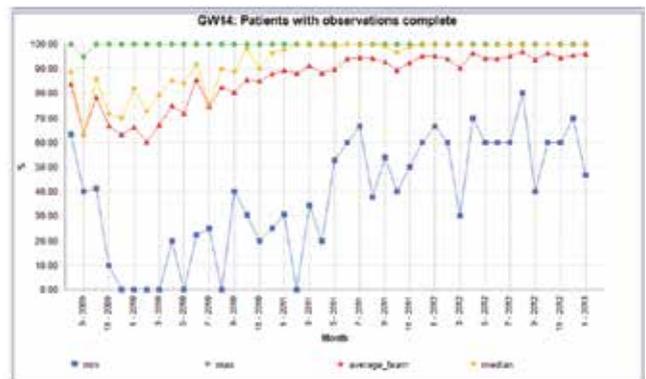
The short answer to this question, with regard to healthcare, is, of course, no. With the exception of a small number of highly regulated and monitored processes, such as blood transfusion and day-case anaesthesia in ASA 1 and 2 patients, our systems usually work at around 60 to 80% reliability (as discussed in the report and supported by much other evidence<sup>5,6</sup>). Data and measurement are key to improvement. Most staff have no idea that care is so unreliable. Measurement and feedback alone, demonstrating the scale of the problem, can lead to improvement.<sup>7</sup>

Within a structured safety programme we have shown that care can be made more reliable using ‘the model for improvement’, particularly Plan, Do, Study, Act (PDSA) cycles, and collaborative working to share

ideas between teams and accelerate change. Collaborative working using the Breakthrough Series (BTS) Model<sup>8</sup> has been effective in the Scottish Patient Safety programme and in my region, the South West of England (see figure 2). We have modified the BTS technique for local use in our hospital; the restraints of limited finance and staff availability meant we could not free up teams from wards for whole day meetings (as described in the BTS). Instead we held two-hour meetings, with great success, generating improvement through ideas developed by frontline staff.

Currently a focus for our improvement work is on the management of sepsis. With limited resources, work should be directed at clinical problems where outcomes

**Figure 2: Improvement in reliability for observations from 18 acute hospitals (serving a population of approximately 5.5 million people) in the South West of England.**



*The poorest performing hospital (in blue) on each data point is shown to improve over time and the median and mean performances become more reliable, eventually performing at over 95%.*

are poor, patient volumes are high and there is evidence to show that reliable delivery of key processes will lead to significant improvement. Rapid identification of sepsis and the timely use of the 'sepsis six' resuscitation bundle has been shown to improve patient outcomes,<sup>9</sup> but reliable delivery is low in many acute hospitals.<sup>10</sup>

### **Is care safe today?**

This may be the most difficult dimension to monitor and measure on a practical basis at the level of a large organisation. The concept of 'sensitivity to operations' is discussed by Vincent and colleagues. Key hospital system team members should be able to monitor and interpret multiple measures that impact on the 'organisational' state of health, just as I, as an intensive care physician, can use all the monitors and current test results to inform me how my patient is right now. However, a critically ill patient can deteriorate very quickly and a hospital that seems safe (by whatever measures are used) at 09.00 on a Saturday may feel very different five hours later when emergency admissions have exceeded the normal numbers, staff have reported in sick and one very complex case is occupying the on-call team of surgeons and anaesthetists in the only fully staffed operating theatre.

### **What measures are used to define how safe a hospital is right now?**

Flow intuitively must be an important component of safety. Most NHS hospitals operate an alert system triggered by bed state and emergency department waiting

times with a black alert being the most severe status level, on the apex of a 'traffic light' system of green, amber and red. A black alert is issued when 'all actions have failed to contain service pressure and the local health economy is unable to deliver comprehensive emergency care'. This means that the hospital is at full capacity: admissions are temporarily closed, escalation beds are in use, patients are waiting in the emergency department for beds, and routine surgery is being cancelled. Under severe escalation conditions patients are nursed in less than optimal locations and extra staff are brought in who may not work regularly in the organisation. The hospital has now used its maximum capacity to meet demand and it is highly likely that care is compromised under these circumstances. Seasoned staff can react instinctively as they walk into a hospital area, sensing whether it 'feels' safe or not. This type of intuitive response, actually learned from experience, is described by Malcolm Gladwell in his book *Blink*.<sup>11</sup> Pattern recognition informs staff that an environment that is busy, noisy and with rushed colleagues, is an environment where harm is more likely to occur.

The organisational safety level depends on a multitude of other factors as well as flow, such as inadequate staffing ratios, staff sickness rates, poor education and training, equipment failure and inadequate estate maintenance. Safety may be compromised by system failures that occurred days ago, such as supply chain issues which fail to deliver central lines to an intensive care unit:

does this become a safety issue on the day the delivery fails or when there is no line to insert into the critically ill patient? Very minor problems which distract key staff from patient care can lead to harm, such as a printer failure for labels, no paper for a fax machine to send discharge summaries and no notes trolley to prevent records becoming muddled. The aggravation caused, time wasted and therefore potential for harm increased by these ‘trivial’ problems cannot be underestimated when staff are already stretched to the limit. Sujan describes a method – proactive risk monitoring in healthcare (PRIMO)<sup>12</sup> – to capture these low-grade irritations and distractions, as part of an analytical tool to assess the safety level of a system.

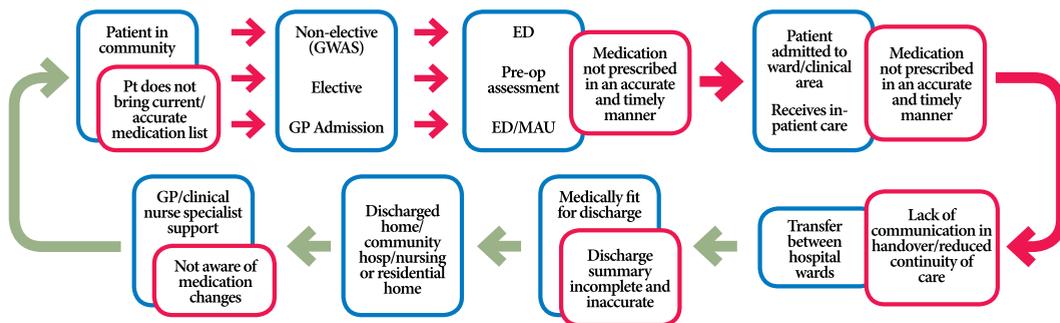
Hospitals that have spent many years working on patient safety, such as Cincinnati Children’s Hospital, describe a ‘system of safety’ composed of a continuous reassessment of risk, communication of status and mitigation, and prediction and planning. A daily hospital-wide bed huddle occurs which includes pharmacy, transport, facilities, security and outpatient staff. Patients who are ‘watchers’ (ie those patients with high early warning scores, or whom staff are concerned about) are discussed, allowing reallocation of resources if needed. Three times a day ‘safety huddles’ occur in clinical areas. This approach has seen a reduction in cardiac arrests and serious safety events.<sup>13</sup> While Cincinnati Children’s Hospital has been a leader on safety for many years, many organisations, including my own, are now using some

of these techniques. Ward safety briefings are performed at the start of each shift and intentional rounding is used to proactively identify patient needs to provide care and to prevent harm, such as from falls. Preoperative safety briefings are used to discuss potential areas of risk before the start of an operating list, an approach shown to improve communication, teamwork and safety.<sup>14</sup> Reliable use of a standard early warning scoring system provides an objective measure for the status of high-risk patients – the placement and number of these patients should be reviewed on a regular basis by site teams to ensure staffing levels are appropriate.

### **Will care be safe in the future?**

We have been privileged to be part of the Health Foundation’s Safer Clinical Systems improvement programme. Our project has examined how we ensure the timely administration of high-risk medications to patients as they journey through the hospital from the community until they leave. We have studied patients with Parkinson’s disease, as these patients require their medication to be given within a critical timeframe. We found the use of a failure modes and effect analysis (FMEA) very useful to define the points of greatest risk in the patient pathway where improvement work should be focused (see figure 3 overleaf). We have developed a safety case (as discussed in Chapter 3 of *The measurement and monitoring of safety*), which has proved a useful document to structure our learning and to demonstrate the areas where we have

**Figure 3: Patient pathways through the hospital system with FMEA analysis**



reduced the safety risk, however we are unsure as yet about the wider applicability of this methodology in healthcare.

Other, more commonly used techniques to anticipate and avoid future harm are simulation and human factors training. The benefits of improved teamwork and communication skills in avoiding harm are well established. Checklists for high stress, high-risk situations have been developed to ensure that critical steps are not omitted.<sup>15</sup> Standardisation of pathways ensures that, under duress, teams can automatically anticipate steps and follow guidelines; such techniques have been used for many years within the advanced trauma life support (ATLS) and advanced life support (ALS) protocols.

### Are we responding and improving?

Highly reliable industries, such as the nuclear or commercial aviation industries, foster cultures of learning from incidents and near misses. Harm event reporting is recognised as a valuable tool to identify hazards and learn from them, and patients who have been

harmed wish to be reassured that learning will occur and the same harm will not happen to ‘someone else.’ However, we know that only a small percentage of harm events are reported and ‘near misses’ are rarely reported. Local surveys in our organisation suggest that staff often do not value reporting as they are not convinced that learning occurs. Our staff say that reports enter ‘a black hole’ never to be seen nor heard of again; we are not unique. The safety literature reflects our local findings; the most frequently stated barrier to reporting for doctors and nurses is lack of systematic analysis of reports and feedback.<sup>16,17</sup>

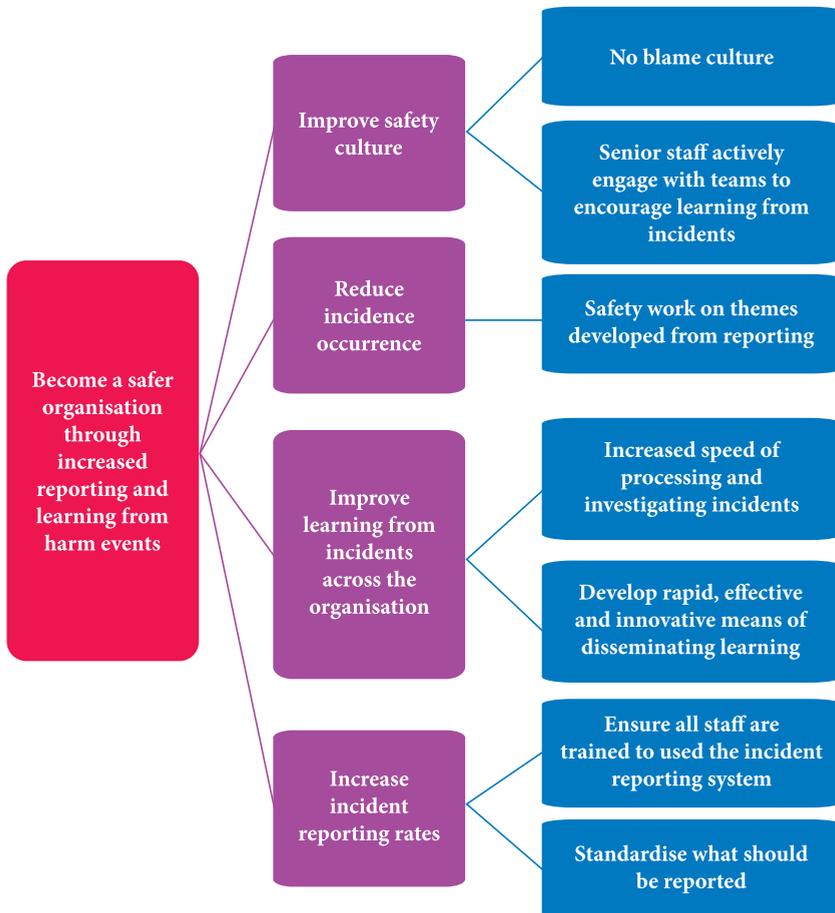
Staff groups differ in their reporting levels with nurses more likely than doctors to know how to access a report, to have ever completed one and to know what to do with it when it is completed. A small subset of incidents are frequently reported. These are often incidents that are witnessed and usually associated with immediate outcomes, such as patient falls and medication errors requiring corrective treatment. Improving the value of reporting

and learning systems is not just a UK problem but is seen as essential for all hospital systems internationally.<sup>18</sup>

Creating a safer culture requires staff to report incidents and to trust that learning will be fed back to them showing what action has been taken; indeed the level of incident reporting within an

organisation positively correlates with the culture of safety within that organisation. As an organisation in the lowest quartile of reporting, we have been working to understand how to improve our culture around incident reporting and have developed a structured approach based on the driver diagram below (figure 4).

**Figure 4: Driver diagram to become a safer organisation through increased reporting and learning from harm events<sup>19</sup>**



One of the areas we have identified as a particular problem is the dissemination of learning around a large organisation. Different groups of staff need to be communicated with in different ways; for example nurses will rarely access email at work and different staff groups want safety messaging to be specifically targeted at areas relevant to them. We have been working on developing innovative ways of delivering lessons learned from safety incidents, supported by a Health Foundation Shine award. The project, perhaps unsurprisingly, is challenging and there appears to be no easy answer. Simple methods, such as a regular safety bulletin delivered to staff rest areas may, in fact, be most effective.

As a clinician who has been working in patient safety for a number of years, one of the key lessons I have learned is the importance of good communication; I would advise large-scale patient safety programmes to consider using professional communication teams to engage and enthuse all staff members.

## Conclusion

At the Royal United Hospital, Bath we have demonstrated that we can make care safer for our patients; for example we have reduced harm events by 50% over two years (measured by global trigger tool analysis of a regular sample of patients' notes). Our participation in a patient safety programme (the South West Patient Safety and Quality Improvement programme) has led to improved reliability in key process areas. However, as we grow in maturity in our understanding of safety and improvement we know that we have so much more to do.

The framework for safety measurement and monitoring proposed by Professor Vincent and colleagues provides a very useful tool around which we can develop further work programmes and consider how best to ensure that we deliver the safest care possible to our patients.

## References

- 1 Vincent C, Burnett J, Carthey S. *The measurement and monitoring of safety*. The Health Foundation; 2013.
- 2 *The Mid Staffordshire NHS Foundation Trust public inquiry*. Chaired by Robert Francis QC. www.midstaffspublicinquiry.com
- 3 Griffin FA, Resar RK. *IHI global trigger tool for measuring adverse events*. IHI Innovation Series white paper. 2nd edn. Cambridge, MA: Institute for Healthcare Improvement, 2009. www.IHI.org
- 4 *Move your dot™: measuring, evaluating, and reducing hospital mortality rates (Part 1)*. IHI Innovation Series white paper. Cambridge, MA: Institute for Healthcare Improvement, 2003. www.IHI.org
- 5 McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, Kerr EA. The quality of health care delivered to adults in the United States. *New Engl J Med* 2003;348:2635–45.
- 6 McCarthy M. One in four deaths from heart disease and stroke in the US is preventable. *BMJ* 2013;347:f5451.
- 7 Bridgewater B, Grayson AD, Brooks N, et al. Has the publication of cardiac surgery outcome data been associated with changes in practice in northwest England: an analysis of 25,730 patients undergoing CABG surgery under 30 surgeons over eight years. *Heart* 2007;93:744–48.
- 8 *The breakthrough series: IHI's collaborative model for achieving breakthrough improvement*. IHI Innovation Series white paper. Cambridge, MA: Institute for Healthcare Improvement, 2003. www.IHI.org
- 9 Daniels R, Nutbeam T, McNamara G, Galvin C. The sepsis six and the surviving sepsis campaign resuscitation bundle: a prospective observational cohort study. *Emerg Med J* 2011;28(6):507–12.
- 10 National Services Scotland. *Sepsis management in Scotland*. Edinburgh: National Services Scotland; 2010. www.stag.scot.nhs.uk/Publications/STAG-SEPSIS-Report-November-2010.pdf
- 11 Gladwell M. *Blink. The power of thinking without thinking*. London: Penguin; 2005.
- 12 PRIMO. See: www.health.org.uk/areas-of-work/programmes/primos
- 13 Goldenhar LM, Brady PW, Sutcliffe KM, Muething SE. Huddling for high reliability and situation awareness. *BMJ Qual Saf*. 2013 Jun 6. [Epub ahead of print].
- 14 Einav Y, Gopher D, Kara I, Ben-Yosef O, Lawn M, Laufer N, et al. Preoperative briefing in the operating room: shared cognition, teamwork, and patient safety. *Chest* 2010;137(2):443–49.
- 15 Bowles TM, Freshwater-Turner DA, Janssen DJ, Peden CJ; RTIC Severn Group. Out-of-theatre tracheal intubation: prospective multicentre study of clinical practice and adverse events. *Br J Anaesth*. 2011;107(5):687–92.
- 16 Evans SM, Berry JG, Smith BJ, Esterman A, Selim P, O'Shaughnessy J, DeWit M. Attitudes and barriers to incident reporting: a collaborative hospital study. *Qual Saf Health Care* 2006;15(1):39–43.
- 17 Mahajan RP. Critical incident reporting and learning. *Br J Anaesth*. 2010;105(1):69–75.
- 18 US Department of Health and Human Services. *Hospital incident reporting systems do not capture most patient harm*. Washington, DC: US Department of Health and Human Services; 2012.
- 19 Peden et al. Abstract. National Patient Safety Congress, Birmingham, 2012.

The Health Foundation is an independent charity working to continuously improve the quality of healthcare in the UK.

We want the UK to have a healthcare system of the highest possible quality – safe, effective, person-centred, timely, efficient and equitable.

We believe that in order to achieve this, health services need to continually improve the way they work. We are here to inspire and create the space for people to make lasting improvements to health services.

Working at every level of the system, we aim to develop the technical skills, leadership, capacity and knowledge, and build the will for change, to secure lasting improvements to healthcare.

The Health Foundation  
90 Long Acre  
London WC2E 9RA

T 020 7257 8000  
E [info@health.org.uk](mailto:info@health.org.uk)

Registered charity number: 286967  
Registered company number: 1714937

For more information, visit:

**[www.health.org.uk](http://www.health.org.uk)**

Follow us on Twitter:

**[www.twitter.com/HealthFdn](https://www.twitter.com/HealthFdn)**

Sign up for our email newsletter:

**[www.health.org.uk/newsletter](http://www.health.org.uk/newsletter)**