Nurses’ use of technology for patient assessment and observation is improving patient care and safety, as case studies from Croydon and Merseyside show

Improving observation with new technology

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In this article...
- Shortcomings of traditional patient-observation methods
- How e-systems can improve assessment and observation
- Potential benefits for nurses and patients

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Recording and monitoring vital signs is one of the early skills we learn in training, and “doing the observations” is often one of the first tasks we undertake when we enter into clinical practice. Despite this, nurses might not adhere to monitoring protocols and this can lead to failure to pass on information about those patients who are deteriorating. Recording observations on paper charts is fraught with challenges, and electronic charting systems could make it easier to pick up and act on patient deterioration. Timely observations have been linked to appropriate escalation and a reduction in cardiac arrests.

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At a time when nurse staffing resources can be stretched, slippage in the routine recording of observations is possible as a result of competing clinical priorities. Often, the recording of observations is undertaken by the least experienced member of the ward team, with the possible consequence that there is a failure to recognise and raise concerns about deteriorating patients.

Recording observations on paper charts at the end of beds is usual practice and is fraught with the usual challenges of legibility and inaccurate charting. Similarly, it could be argued that “doing the observations” carries with it a culture of routine, task-focused activity, as it is the doing of the observations rather than the interpretation that carries the focus.

The Royal College of Physicians (RCP, 2012), in a report of a working party, advocates the use of a National Early Warning System (NEWS) to record a standard set of physiological observations and therefore track and trigger an appropriate response to clinical deterioration.

The RCP recommends that NEWS should be used for initial assessment of acute illness, as well as for continuous monitoring of a patient’s condition (see box 1). Recording observations on a regular basis allows any deterioration in a patient’s condition to be identified early, but can also show progression towards improvement and recovery. Despite our knowledge about the importance of early warning signs, a report by the National Confidential Enquiry into Patient Outcome and Death (NCEPOD, 2012) concluded that the warning signs for deteriorating patients, who ultimately went on to have a cardiac arrest, were recognised poorly, acted on infrequently and escalated to more senior doctors infrequently.

The role of technology

So how can technology help? Electronic charting systems have the potential to make a real difference as they allow the early warning scores to be quickly calculated.

5 key points
1 Recording of patient observations is often undertaken by the least experienced members of the ward team
2 A national enquiry into cardiac arrest shows patient deterioration is often not picked up
3 The National Early Warning System (NEWS) is a set of patient observations including pulse, respiration rate and temperature
4 Nurses can record observations and calculate NEWS scores more promptly using handheld devices
5 Timely observation is linked to more appropriate escalation and fewer cardiac arrests
“Compassion, patience and a good dose of humour are the foundations of being a good nurse”

Emma Gee

data to be electronically processed, allowing for deteriorating patients to be recognised automatically through the use of algorithms and automatic track-and-trigger systems.

The use of electronic observations also allows the clinician, to whom the escalation is noted, to review the observations promptly and remotely.

The case studies below show how such systems have been developed and implemented, and how investment in technology seeks to improve our clinical response to deteriorating patients.

However, technology is not a solution in its own right. Vital-signs monitoring still needs the attention of skilled nurses to interpret and respond to patients’ needs. It is also important that nurses embrace the challenge that integrating technology into practice presents.

We know that organisational work-based cultures affect the implementation of change (Elliott et al, 2015), and in order to make the best of what technology offers, nurses might need to challenge prevailing cultures. Technology will not take away the need for nurses to act as coordinators and to assume responsibility for the regular and routine management of vital signs monitoring.

Similarly, nurses need to take on a key role in the development and implementation of electronic vital-signs systems. Poor systems, implemented badly, can affect the way we care for patients.

The following examples show how healthcare professionals have embraced the technology challenge and are positively dealing with the cultural and organisational challenges that the adoption of technology poses to nursing practice.

Improving outcomes in Croydon

Croydon Health Services Trust provides acute and community healthcare services to a population of more than 360,000 in and around the South London borough of Croydon.

In 2010, through a thematic review of serious incidents, the trust identified variations in the management of deteriorating patients around eight themes.

These were:
- Delays in observations;
- Inconsistency in number of observations taken at night;
- Poor consistency in clinical observations of deteriorating patients;
- Failure to detect deteriorating patients;
- Failure to recognise signs of a deteriorating patient;
- Failure to respond to deteriorating patients;
- Failure to respond in peri-arrest period;
- Lack of standard identification of patients’ risk using early warning scores (EWS).

Many of these themes related to human factors and are a common cause of patient harm. Croydon, therefore, looked at implementing an electronic monitoring system that engineered out human error related to the identification of deteriorating patients and recording of observations.

Previous attempts to tackle these problems with paper-based observation charts had been ineffective and were failing to drive more consistent practice or deliver better patient outcomes.

A deteriorating patient-care bundle

Croydon decided to deploy electronic technology (VitalPAC) and used this to develop an IT-based system across all adult general wards, as it enables clinicians to record patient data on iPod Touches, immediately calculate the EWS and advise on next steps, including when to escalate care and when to repeat observations.

Outcome measures were brought together across five themes into a care bundle, three taken directly from an electronic performance-monitoring database. A bundle is a structured way of improving processes of care and patient outcomes. It is a small, straightforward set of practices - generally three to five – that are proven to improve patient outcomes.

Our bundle comprises the number of late observations, the percentage of night-time observations, numbers of patient escalations via EWS, the number of patients admitted unexpectedly to ITU and cardiac arrests not escalated.

These themes were amalgamated into a dashboard of outcome measures. The care bundle allows the trust to reduce variability and monitor compliance, while at the same time significantly improving patient outcomes.

Early indications appear to show success for the project, with a correlation between cardiac arrest numbers and percentage of observations recorded on time as prompted by the electronic system. The greatest improvement was shown at night.

Results from the care bundle

The following have been achieved from the beginning of October 2013 and end of December 2014:
- 98% of patients are appropriately escalated on the basis of EWS;
- Observations on time (within 1.5 hours) increased from 60% to 80%;
- Observations at night increased from <45% expected to >80%;
- 50% fewer unplanned admissions to ITU;
- 45% fewer cardiac arrest calls (see Figure 1).

Weekly audits are undertaken of all patients transferred into ITU or suffering a cardiac arrest, who have not been escalated. The findings of these reviews have been interesting and show that in 90% of cases, patients’ EWS scores were not above 5, indicating the need to trigger an escalation. However, scores had increased by 2 or 3 points in one jump immediately prior to sudden deterioration.

This has resulted in the production of an EWS algorithm that prompts staff to take simple action when a rise of 2 or 3 points occurs.

This included checking the most recent blood results, urine output and recording 12 lead ECG.

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“Paper-light” nursing
The Walton Centre is a dedicated neurosciences trust in Liverpool, serving a population of about 3.5 million across Merseyside, Cheshire, North Wales and the Isle of Man. It is a specialist trust providing secondary and tertiary care in neurology, neurosurgery, critical care, pain medicine and neuro-rehabilitation.

For the last few years, it has adopted a relatively unusual approach to its IT systems based on a commitment to in-house software development wherever possible, combined with other commercial applications, connected by an integration engine, and all accessed via one clinical portal (again developed in-house). This project now comprises a number of different clinical modules, which together form an evolving system called ‘e-patient’. These currently include:

» Self check-in kiosks in outpatients;
» Nursing risk assessments;
» E-observations and NEWS;
» E-referral management (electronic triaging of referral letters);
» TIMS (theatre management system);
» Clinical outcome measures in long-term conditions such as multiple sclerosis and pain clinics.

In-house development has several advantages over the usual process of commercial software procurement.

These include:

» Flexibility: the ability to design bespoke software for specific requirements;
» Ongoing development: freedom to continue developing modules over time, to continually improve them and modify in response to changing needs;
» Freedom from “vendor lock-in”;
» Lower cost: although investment is required in the form of software developers and IT support, the cost compared to commercial software licences is low;
» Freedom to share developments with other NHS organisations.

There are challenges to this approach, including the need for investment in programmers/ coders and project managers, and the requirement of active clinical engagement in the development process.

Investment is also needed for ongoing technical support when clinical systems ‘go down’, although this can be outsourced.

Assessments and observations via iPad
The admission risk assessments and e-observations have been the most significant changes to current practice on acute wards. Nurses use iPads to access e-patient, which is linked to the patient administration system, so it automatically populates patient documents with their demographic details. The panel of risk assessments, such as Waterlow pressure ulcer risk score and venous thromboembolism risk assessment, are then completed via a user-friendly interface on an iPad, directly into the patient record.

The results of the risk assessments or a flag to mark any outstanding assessments are then displayed on a screen at the nurse’s station, and those at high risk are also highlighted. The screen at the nurses’ station also includes data, such as messages in the e-doctors workbook, and status of any pending referrals to physiotherapy, occupational therapy or speech and language therapy.

Digital display of routine observations
The next step toward “paper-light” nursing is a system to digitally record and display all the routine nursing observations, as well as automatically calculating and displaying early warning scores. This would be an improvement on the paper temperature, pulse and respiration (TPR) charts for several reasons including:

» Clarity/legibility;
» Audit trail (who recorded what and when, flagging up late or missing observations);
» Ability to display observations in multiple sites simultaneously such as the bedside, nurses’ station, and doctor’s office;
» Automated calculation of EWS;
» Automated escalation of EWS to appropriate staff (such as the critical care outreach team).

The trust successfully applied to the 2014 Regional Innovation Fund, which funded the first three months of development and programming, to get the trust to an initial pilot phase, which has just been completed.

As a specialist trust, the nature of the patient group meant adapting the national EWS chart, for example, using the Glasgow Coma Scale instead of “alert, voice, pain, unresponsive” (AVPU), to assess the level of consciousness. Developing in-house allowed the trust to do this, as well as working rapidly through early versions, following input from medical and nursing staff, prior to initial pilot.

Involvement of nursing staff was crucial, from ward staff to the director of nursing, and at all stages of development including ongoing modifications and improvement. The vision is to bring these and other modules together, forming a fully functional electronic patient record that can be maintained and developed over the years, as well as shared with other NHS organisations.

Conclusion
These case studies show how different technologies are being adopted with the aim of improving the clinical response to the deteriorating condition of patients. They also show how handheld devices are integrated into the bedside work of nurses.

In an environment where nursing skills are in great demand, automated vital-signs monitoring lessens some of the need to rely on the experience and intuition of nurses (Odell et al, 2009), in order to detect deterioration in ward patients.

There is no “one size fits all” approach to adopting technology.

Sometimes technology is used to solve a specific issue. For example, Croydon had a particular issue with patient observation; or a whole-system approach to electronic records may be adopted, as illustrated at the Walton Centre.

There are other examples of vital-signs monitoring systems that aim to improve care using observation systems and EWS. These new, emerging technologies also illustrate how technology can be used at the patient bedside for direct patient care. Whichever approach is adopted, it is important that staff are engaged and understand the benefits for patients.

References

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