How to measure and record vital signs to ensure detection of deteriorating patients

Staff need to recognise and act appropriately when patients deteriorate. This article gives practical advice on using basic observations to monitor patients.

BACKGROUND

It is well recognised that hospitals may not consistently be the safe place that patients and their families expect. Indeed, some literature suggests that patients may receive suboptimal care and early recognition of deterioration can be inconsistent (The National Confidential Enquiry into Patient Outcome and Death, 2005). This is supported by research on cardiorespiratory arrest in hospital, where one study showed that 60% of cardiac arrests, deaths and unplanned admission to intensive care units had detectable deterioration in vital signs (Hillman et al, 2001). Serious incidents that were reported to the National Patient Safety Agency (2007) identified that 11% of deaths were due to patient deterioration not being recognised or acted on appropriately. The main areas for improvement were:

- Regular observations;
- Early recognition of deterioration;
- Improved communication;
- Effective response to concerns.

Nurses are pivotal to influencing observations management and, ultimately, patient safety. Patient Safety First’s intervention on reducing harm from deterioration, common issues for ward staff are illustrated and practical advice is given.

PATIENT SAFETY FIRST

Patient Safety First aims to make sustainable change to the way NHS staff approach patient safety, making it everyone’s highest priority. The campaign focuses on five main clinical and leadership interventions known to make a difference, including reducing harm from deterioration. For more information and resources see www.patientsafetyfirst.nhs.uk.

TACKLING DETERIORATION

The national patient safety agenda and, occasionally, individual trust agendas can sometimes feel removed from busy clinical areas where there are multiple clinical, organisational and managerial challenges to prioritise on a shift to shift basis. Drawing from clinical cases and taking practical advice from Patient Safety First will help provide solutions.

Nurses play an essential role in influencing patient safety every day. However, taking observations or measuring vital signs is increasingly being seen as a task based activity rather than the gathering of clinical information. This poses a real danger for patients. Without effective leadership from nurses in senior roles, there is the potential for patient observations not to be seen as a serious responsibility.

The most important vital signs are:

- **Heart rate:** registered and non-registered staff are formally trained to feel patients’ pulse. However, once in a clinical setting, the culture reverts to recording the heart rate from automated equipment, a Dinamap or equivalent. While this is accepted practice – as it is quick and easy and, in theory, removes some of the potential for human error – it is not the most effective method of gathering clinical information about patients’ cardiovascular status. Important clinical information such as pulse volume, rate and rhythm, together with patients’ peripheral temperature picked up on touch, are all lost if equipment alone is used.

- **Blood pressure:** most blood pressure recording is undertaken with automated machines. There are benefits as this removes some of the variability that may exist between operators. However, issues such as cuff size often feature in concerns over...
accuracy. Moreover, skills in manual auscultation of blood pressure using a sphygmomanometer are lost. It is important to remember that using the incorrect cuff size in manual blood pressure measurement can also make this unreliable.

- **Respiratory rate**: many hospitals involved in monitoring their reliability in recording physiological observations, such as the Safer Patients Initiative or Productive Ward sites, have noted that the recording of respiratory rate is frequently absent, despite its importance in alerting staff to deterioration in a patient’s condition. There are many suggestions about why this might be the case, including a lack of mechanical equipment capable of recording respiratory rate and variability between observers.

- **Level of consciousness**: there are a number of ways this is detected, such as AVPU (Alert, responds to Voice, responds to Pain, Unresponsive). This quick and easy tool gives a clear guide on patients’ level of consciousness; patients are identified as being at risk if they respond only to pain or are unresponsive. This would equate to a Glasgow Coma Scale (GCS) score of 8-9 and therefore the patient would require an urgent review as their airway may be at risk. The GCS has been widely used for many years to assess consciousness level and is scored from 3 to 15, three being the worst, and 15 the best. It consists of three parameters: best eye response, best verbal response and best motor response.

- **Pulse oximetry**: an observation of pulse oximetry can often be used to confirm practitioners’ clinical view. However, this can be misleading and inaccurate in some patients, such as those with anaemia, arrhythmias, poor peripheral perfusion and those who have been exposed to carbon monoxide. Used with appropriate clinical judgement, pulse oximetry, together with respiratory rate, signs of increased work in breathing, colour and “new” patient confusion, all have the potential to consistently provide valuable information.

- **Urine output**: this is used in many trusts with some merit as oliguria is a sensitive indicator of poor perfusion, a reduced cardiac output and an early indicator of acute renal failure. This parameter often causes problems in general ward areas as many patients will not be on hourly urine measurements or may not be on fluid management charts. Getting into the habit of asking even mobile patients about urine output is not a waste of time as it can be an early indicator of causes for concern.

Boxes 1 and 2 outline case studies showing signs of patient deterioration that were not detected or acted upon.

**COMMENTARY ON CASE STUDY 1**

This is not an unusual case and illustrates some of the pitfalls of vital signs recording and track and trigger systems. Non-shockable cardiac arrests, that is, asystolic or those with pulseless electrical activity, form the majority of in-hospital cardiac arrests and carry the highest mortality. The primary cause of the event is not always cardiac in origin and so the underlying cause has to be determined and addressed for a successful outcome to be achieved. In this case the following questions should be asked:

- **Who is taking observations?**
  In many ward areas, observations are taken by a range of staff, including both registered and non-registered members of the team. It is worth reviewing the education and competency packages in use. The Department of Health (2009) has developed a framework of core competencies and skills that teams need if they are caring for acutely ill patients.

- **Can you be sure all staff undertaking observations have the necessary knowledge and skills?**
  It is easy to become complacent about vital signs when their recording is seen very much as a task to be undertaken rather than a key clinical skill in putting patient safety first.

- **What provision is there for regular updates and checking accuracy?**
  In reality this is difficult to achieve but it is, nonetheless, necessary. Ensure that your ward area participates fully in measuring compliance with observations. Plotting and tracking observations will help motivate staff to see this as important. As an example, nurses can use the Patient Safety First “check your charts template” (tinyurl.com/check-charts-template). This is a good way of involving all staff and maintaining standards.

Mr Brown’s pre existing cardiac problems caused confusion with observations that could have been perceived as normal. Patients with atrial fibrillation and hypertension can cause confusion with track and trigger systems such as early warning scores and modified early warning scores, as there can be a tendency to accept parameters as “the norm” and therefore miss subtle changes in the patient’s condition.

In Mr Brown’s case, his blood pressure would have been considered normal. However, for him, this pressure constituted hypotension; it contributed to his poor urine output and accelerated his clinical deterioration.

There are no quick and easy solutions to this problem. Track and trigger tools, by definition, are broad and not patient specific. Solutions need to be trust wide and could include “acceptable heart rate or blood pressure” parameters on observation charts. Patients would then not trigger above or below this rate. This has the potential to cut false triggering, which causes desensitisation to the tool. However, decisions to accept vital signs outside normally accepted

**BOX 1. CASE STUDY 1**

Tom Brown*, aged 68, was admitted to the intensive care unit following successful resuscitation for a pulseless electrical activity arrest. His past medical history included hypertension and atrial fibrillation controlled with digoxin. He had been admitted to an acute medical ward five days earlier with a lower respiratory tract infection and started on intravenous antibiotics and chest physiotherapy. His observations had been recorded six hourly, as per ward protocol, since admission. Although these triggered an alert on the early warning score system, the results had been added up incorrectly. A review of his observation charts in intensive care revealed that in the two days before his arrest:

- **His respiratory rate was slowly increasing;**
- **His blood pressure was falling from his baseline of 165/80 to 110/65;**
- **His heart rate had risen from 98 and irregular on admission to 130;**
- **The fluid balance chart showed increasing oliguria and poor oral intake secondary to nausea and vomiting;**
- **His early warning score had been incorrectly calculated and repeated.**

*The patient’s name has been changed.*
parameters need to be reviewed carefully. A consultant or senior registrar would be best placed to make this judgement based on a thorough review of the patient and clear documentation in the medical notes. Clear guidance and training for this would be vital. It is a method used successfully in some trusts with the requisite safety systems in place for specifying who, what grade, and in which circumstances it should and – importantly – should not be used.

In this case, Mr Brown’s condition was detected and reported eventually, but it was reported to a junior doctor who may not have the skills or experience to make an appropriate judgement. The National Institute for Health and Clinical Excellence (2007) suggested the response to a trigger should be a doctor with sufficient experience to manage the patient in question.

Not all patients at risk will be moved to a higher care area. Recognition and awareness of those at risk in the clinical area can be a significant challenge in rapidly changing ward cultures. Consider using the patient location/ward whiteboard to provide an instant visual reminder of the location of those at risk, not only for all nursing staff but also for medical/allied health professionals. The Royal Devon and Exeter Foundation Trust uses an alarm icon on the physical and electronic patient administration system to denote patients at risk, which:

- Provides a visual trigger of those at risk;
- Allows the nurse in charge to ask questions about clinical management plans, providing clinical leadership and support for more junior team members;
- Prompts discussion about placing patients at risk together to facilitate nursing and appropriate observation;
- Allows a trust wide view of acuity, which is important for staff allocation.

**COMMENTARY ON CASE STUDY 2**

An increasing respiratory rate and greater effort by patients to breathe are recognised as robust indicators for physiological decline. Although this applies to all patients, staff often appear to be more concerned about the percentage of oxygen saturation.

The second case study further illustrates the dangers of assuming that a parameter is normal. In this situation being tachypnoeic was “normal” for Mrs Armitage; what was abnormal, and a clinical indicator of deterioration, was the steady increase of her respiratory rate. Issues surrounding desensitisation to parameters and early warning scores are always a risk in busy clinical areas. The solutions are not always clear so leadership has an important part to play:

- Consider short patient safety briefings at one or two points during the shift. These need only take a few minutes, with staff members reviewing early warning scores and areas of concern. This provides a defined forum for nurses to challenge all scores and triggers, allowing clinical support for escalation and a review of the trend of patients’ progress;
- Review handover processes. Try to put patient safety at the centre of the handover with early warning scores handed over as part of patient details;
- Ensure escalation is appropriately documented and that all staff caring for specific patients are clear about the next steps that should be taken;
- Improve communication. Hand over all patients using a communication tool such as SBAR (situation-background-assessment-recommendation, see Changing practice, page 13) or RSVP (reason-story-vital-signs-plan) (Featherstone et al, 2008). This enables all staff to become familiar with the process; in addition, it gives confidence to more junior staff and helps them to coordinate their thoughts and the escalation of patients appropriately.

In summary, observations that are often perceived as basic and routine are a vital part of the information gained to ensure safer patient care and the early recognition of deterioration. Patient safety can and should be influenced at ward level on a daily basis. Without the active involvement of all nurses, it will not be seen as a priority. Patient safety is everyone’s responsibility and should be at the forefront in everyday practice.

The Patient Safety First website, www.patientsafetyfirst.nhs.uk, features a “how to guide”, which gives details on reducing harm from deterioration, provides access to a network of trusts taking similar steps to achieve safer healthcare and offers further practical advice on taking good care of patients whose condition is deteriorating.

**REFERENCES**


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**BOX 2. CASE STUDY 2**

Jenny Armitage*, aged 76, had long standing chronic obstructive pulmonary disease, and was admitted to a respiratory ward with an infective exacerbation. Mrs Armitage has chronic respiratory problems that limit both her exercise tolerance and activity. She normally has a respiratory rate of 30. On admission she had a respiratory rate of 32 which was thought to be normal for her. Observations continued on a six hourly basis, which was the norm for that ward. Two days after admission her oxygen saturations were noted to be 78% on a 28% Venturi mask. On closer examination, Mrs Armitage had a respiratory rate that had been slowly increasing to a rate of 44 since admission. She was using all her accessory muscles and was both peripherally and centrally cyanosed. She was tachycardic at 110bpm regular and hypertensive at 168/95mmHg. Her early warning score had been recorded over the last few days but no score had been entered for respiratory rate as she is normally tachypnoeic.

* The patient’s name has been changed.