

Vital signs in hospitals at night. Dying to sleep?

Monitoring vital signs (e.g., blood pressure, pulse rate, respiration rate) is a crucial aspect of patient care in hospital. Vital signs indicate a patient's clinical condition; are necessary for the calculation of early warning scores; and are used to determine the monitoring, escalation and intervention that are required subsequently. There is evidence that nurses' compliance with vital sign monitoring protocols and guidelines may be poor, especially at night. In this digest we explore the evidence describing the current practice of monitoring vital signs at night, describe the possible consequences, and outline potential solutions to improving compliance with observation schedules.

What is the problem?

The National Institute for Health and Clinical Excellence (NICE) recommends that observations should be monitored at least every 12 hours, with the frequency increasing if abnormal physiology is detected. [1] Evidence shows that inadequate responses to deterioration remain the most common cause of critical incidents reported to a National Database in the UK. [2] In particular, concerns exist that delayed detection and escalation due to current nursing approaches to patient monitoring [3] undermines the effectiveness of innovations aimed at improving detection. In 2007 the NPSA reported that staff '*rarely carry out routine observations during the night*' and that '*observations are seen as tasks with a low priority*'. [4]

How big is the problem?

A study in a Scottish teaching hospital found nearly all early warning charts for patients causing overnight clinical concern were incomplete, with 64% omitting one or more observations. [5] In a large study from a single centre in Southern England, the frequency and documentation of observations were less consistent with the hospital protocol at night. [6] Only 13% of the 950,000 vital signs records were taken between the hours of 23:00 hr. and 05:59 hr. Observations were rarely taken during these hours for low acuity patients. Even for patients whose last early warning score between 20:00 hr. and 23:59 hr. indicated a requirement for hourly or more frequent observations, only 57% had an observation recorded between midnight and 05:59 hr. Compliance was much higher during the day, although still far from optimal. [6] Frequency of observations during night shifts for patients discharged from intensive care was significantly lower than during the daytime in a Dutch University Hospital, although results are not stratified by patient acuity. The introduction of a standardised

nursing observation protocol did not have an effect on the frequency of observations at night [7].

Impact on patient outcomes

Effectively detecting and acting on patient deterioration are complex issues. Vital signs observation is a key part of the 'chain of prevention' required to avoid deterioration, cardiac arrest and death. [8] A Patient Safety Observatory report into potentially preventable deaths in acute general hospitals identified 64 incidents related to vital signs observations, including failure to take basic observations. Two thirds of these incidents occurred in the evening or overnight. [9] A retrospective record review in a Belgium tertiary hospital found that deaths with lower frequency of vital signs recording were more likely to be classified as potentially preventable. [10]

Factors contributing to differences in observations between shifts

While a range of issues such as staffing levels, use of intuition, relationships with medical staff, and nurse education have been implicated in nurses' compliance with observations in general, there is little research focusing specifically on time of day. [3] Issues concerning missed vital signs observations at night are reported to relate to nurses' views regarding the importance of patient rest and the negative effects of sleep disruption. [11] A US study of adult medical wards suggested that a patient's acuity was not always taken into consideration when observations were undertaken at night, with 45% of observations conducted on patients with low risk early warning scores. [11] In the UK, vital signs observations were clustered, with peaks in observation frequency occurring at 06:00-07:00 hrs and 21:00-22:00 hrs irrespective of the level of assessed risk, suggesting that the timing of observation was driven by ward routines. [6]

Dying to sleep?

Interventions to improve observations

Risk stratification of patients at the beginning of the night shift to identify patients at risk has been suggested as a strategy to increase compliance of vital signs measurements.[7] The use of electronic vital signs devices, which may improve the vital signs collection process, has been shown to reduce mortality. [12] Implementation of Early Warning Score charts has been associated to increased compliance of vital signs measurements [e.g.13, 14] However, studies have shown that compliance remains lower at night compared to day shifts, even when standardised protocols have been implemented. [7]

Conclusions

- **Studies from hospitals in the UK and elsewhere suggest compliance with vital signs observations at night is low**
- **While the optimal timing and frequency of observations for all patients remains unclear, failure to perform observations at night occurs even for patients with severely deranged physiology**
- **The reasons for poor compliance with monitoring protocols are unclear, but nurses appear to prioritise patient rest over monitoring**
- **The balance of risks and benefits is unclear but the risks from missed observations can be high**
- **Systematic approaches including the use of monitoring protocols improves overall compliance, but the deficit at night remains**
- **Factors specifically affecting observations at night need to be better understood**

Review methods

We undertook a scoping review aimed at identifying the incidence of the problem and major contributing factors to missed observations at night.

A search strategy was built using the key terms ("vital sign*" and (observation* OR monitoring) and night*) and run on OVID Medline, the Cochrane Library, the York Centre for Reviews and Dissemination and Scopus. From a total of 321 references screened, 7 studies offered evidence to the questions.

References

1. National Institute for Health and Care Excellence (NICE), *Acutely ill patients in hospital: Recognition of and response to acute illness in adults in hospital (CG 50)*. 2007, National Institute for Health and Care Excellence London.
2. Donaldson, L.J., S.S. Panesar, and A. Darzi, *Patient-Safety-Related Hospital Deaths in England: Thematic Analysis of Incidents Reported to a National Database, 2010–2012*. PLoS Med, 2014. **11**(6): p. e1001667.
3. Odell, M., C. Victor, and D. Oliver, *Nurses' role in detecting deterioration in ward patients: systematic literature review*. Journal of Advanced Nursing, 2009. **65**(10): p. 1992-2006.
4. *Recognising and responding appropriately to early signs of deterioration in hospitalised patients*. 2007, National Patient Safety Agency.
5. Gordon, C.F. and D.J. Beckett, *Significant deficiencies in the overnight use of a Standardised Early Warning Scoring system in a teaching hospital*. Scottish medical journal, 2011. **56**(1): p. 15-18.
6. Hands, C., et al., *Patterns in the recording of vital signs and early warning scores: compliance with a clinical escalation protocol*. BMJ Quality & Safety, 2013. **22**(9): p. 719-726.
7. De Meester, K., et al., *Impact of a standardized nurse observation protocol including MEWS after Intensive Care Unit discharge*. Resuscitation, 2013. **84**(2): p. 184-188.
8. Smith, G.B., *In-hospital cardiac arrest: is it time for an in-hospital 'chain of prevention'?* Resuscitation, 2010. **81**(9): p. 1209-11.
9. National Patient Safety Agency, *Safer care for the acutely ill patient: learning from serious incidents*. Patient Safety Observatory 2007. 5.
10. De Meester, K., et al., *In - hospital mortality after serious adverse events on medical and surgical nursing units: a mixed methods study*. Journal of clinical nursing, 2013. **22**(15-16): p. 2308-2317.
11. Yoder, J.C., et al., *A prospective study of nighttime vital sign monitoring frequency and risk of clinical deterioration*. JAMA internal medicine, 2013. **173**(16): p. 1554-1555.
12. Schmidt, P.E., et al., *Impact of introducing an electronic physiological surveillance system on hospital mortality*. BMJ Quality & Safety, 2015. **24**(1): p. 10-20.
13. Hammond, N.E., et al., *The effect of implementing a modified early warning scoring (MEWS) system on the adequacy of vital sign documentation*. Australian Critical Care, 2013. **26**(1): p. 18-22.
14. Chen, J., et al., *The impact of introducing medical emergency team system on the documentations of vital signs*. Resuscitation, 2009. **80**(1): p. 35-43.

How to cite: Griffiths, P., Schmidt, P., Recio-Saucedo, A., Smith, G. Vital signs in hospitals at night. Dying to sleep? Evidence Brief, CLAHRC Wessex. Issue 1, May 2015. 1-2