

5. Patient observations and review criteria

Key findings

- Notes seldom contained written requests regarding the type and frequency of physiological observations.
- Instructions giving parameters that should trigger a patient review were rarely documented.
- Respiratory rate was infrequently recorded.
- 27% of hospitals did not use an early warning system.
- 44% of hospitals did not provide an outreach service.
- The provision of outreach services was geographically uneven, with a bias toward provision of outreach in English hospitals.

Introduction

Early recognition of patients with worsening medical conditions will allow a more timely and potentially appropriate response. This is the central theme to many recent educational initiatives including IMPACT (III Medical Patients' Acute Care and Treatment), CCISP (Care of the Critically Ill Surgical Patient), ALERT (Acute Life-threatening Events - Recognition and Treatment) and the programme of critical care outreach and 'track and trigger' systems being promoted by the NHS Modernisation Agency¹⁰ and the Department of Health²⁵.

Observation recording

Early recognition relies on the correct physiological observations being performed at an interval appropriate to the condition of the patient. 439 sets of notes of deceased patients were available for analysis. Table 1 shows that it was unusual for a request to be made for the type and frequency of physiological observations. This is a potential source of error and delayed recognition of clinical deterioration.

Table 1. Type and frequency of physiological observations requested for patients

| | Number of patients by requested frequency of observations | | | | | Total n = 439 | | | | |
|-------------------------|---|-------------|-------|---------------|------------------------|---------------|---------------|------|---------|------|
| | Hourly | Four hourly | Other | Not specified | Observations requested | (%) | Not requested | (%) | Unknown | (%) |
| Pulse | 6 | 1 | 8 | 13 | 28 | (6) | 337 | (77) | 74 | (17) |
| Blood pressure | 6 | 2 | 9 | 16 | 33 | (8) | 335 | (76) | 71 | (16) |
| Respiratory rate | 2 | 2 | 7 | 7 | 18 | (4) | 345 | (79) | 76 | (17) |
| Urine output | 25 | 0 | 8 | 29 | 62 | (14) | 303 | (69) | 74 | (17) |
| Fluid balance | 5 | 1 | 10 | 40 | 56 | (13) | 306 | (70) | 77 | (17) |
| Central venous pressure | 4 | 0 | 1 | 14 | 19 | (4) | 335 | (76) | 85 | (20) |
| SpO ₂ | 6 | 2 | 8 | 14 | 30 | (7) | 334 | (76) | 75 | (17) |
| Other | 4 | 0 | 6 | 2 | 12 | (3) | 355 | (81) | 72 | (16) |

However, whilst it is rare to document a physiological observation plan it is clear that nursing staff did perform observations. Table 2 illustrates the total number of observation points for each parameter in the three days prior to ICU admission. This is expressed as observations per patient per day. Table 3 shows the number of patients in hospital at each timepoint prior to ICU admission. As expected, the rate of observations per patient per day increased, as ICU referral became closer, except for the day of referral to ICU. It is most likely that the trend did not continue for the day of referral to ICU due to the proportionately large number of patients arriving in hospital on that day, giving a large number of incomplete days on which to base the rate. It is clear that pulse and blood pressure and temperature were most frequently recorded and that respiratory rate was the least recorded variable. This is especially worrying, as respiratory rate has been shown to be an early and sensitive indicator of deterioration⁵. This has been shown in all inpatients irrespective of specialty²⁶ and has been validated in acute medical admissions²⁷.

The use of pulse oximetry monitoring has increased considerably during recent years. As can be seen in this study, it was used with greater frequency than respiratory rate monitoring. Whilst pulse oximetry can add additional information it is also open to misinterpretation²⁸. This study revealed that junior doctors and staff nurses were untrained in pulse oximetry, lacked knowledge of basic principles, and made serious errors in interpretation of readings. In addition, there is a common misconception that pulse oximetry measurements obviate the need for respiratory rate monitoring.

Table 2. Observations per patient per day for the three days prior to ICU admission

| Observation | Day | Rate per patient |
|-------------------|-----------------------------------|------------------|
| Pulse | Three days before referral to ICU | 3.17 |
| | Two days before referral to ICU | 4.24 |
| | One day before referral to ICU | 4.36 |
| | Day of referral to ICU | 3.66 |
| Blood pressure | Three days before referral to ICU | 3.87 |
| | Two days before referral to ICU | 4.72 |
| | One day before referral to ICU | 5.09 |
| | Day of referral to ICU | 3.66 |
| Respiratory rate | Three days before referral to ICU | 1.70 |
| | Two days before referral to ICU | 2.48 |
| | One day before referral to ICU | 2.62 |
| | Day of referral to ICU | 2.12 |
| Temperature | Three days before referral to ICU | 2.93 |
| | Two days before referral to ICU | 3.34 |
| | One day before referral to ICU | 3.29 |
| | Day of referral to ICU | 1.49 |
| Oxygen saturation | Three days before referral to ICU | 2.54 |
| | Two days before referral to ICU | 3.71 |
| | One day before referral to ICU | 3.86 |
| | Day of referral to ICU | 3.20 |

Table 3. Number of patients in hospital

| Patients present in hospital (Answers may be multiple) | Number of patients |
|--|--------------------|
| Three days before referral to ICU | 109 |
| Two days before referral to ICU | 128 |
| One day before referral to ICU | 190 |
| Day of referral to ICU | 356 |

Physiological monitoring plan

If patients are not responding to therapy, and continue to deteriorate, it is important to provide clear instructions to the nursing staff when to call for assistance for further review of the patient. Table 4 shows that it was very uncommon for instructions to be given to the nursing staff for parameters that should trigger these reviews. In the absence of instructions detailing factors that should prompt a review of the patient it is not surprising that clinical deterioration can exist for some time before remedial action is taken. This is of particular concern as a large number of observations are now carried out by health care assistants and/or nursing auxiliaries who may not appreciate the clinical relevance of abnormal signs²⁵.

Table 4. Provision of instructions to nursing staff for assistance and further review of patient

| Nurse instructions to alert medical staff | Total | (%) |
|---|------------|------|
| Yes | 18 | (5) |
| No | 366 | (95) |
| Sub-total | 384 | |
| Insufficient data | 55 | |
| Total | 439 | |

One potential explanation for the lack of a physiological observation plan and parameters for further review would be the use of outreach services and early warning systems, as these systems would provide default values that may trigger a review. However, these systems are patchy and often do not cover all patients.

Table 5 shows that 73% of hospitals used some form of 'early warning system' or 'track and trigger system'. The aim of these track and trigger systems is to allow early identification of patients who have physiological abnormalities and to facilitate rapid and appropriate management. The system most often used is the 'early warning score' (modified or not). It is notable that respiratory rate forms an integral component of these track and trigger systems and that, as shown in Table 2 this is poorly recorded. This has the potential to reduce the utility of this approach. The finding that one in four hospitals did not use a track and trigger system combined with the lack of parameters for further review of patients gives cause for concern.

| Table 5. Hospitals' use of early warning systems | | |
|--|---------------------|-------------|
| Early warning system used | Number of hospitals | (%) |
| Medical emergency team | 3 | (1) |
| Patient at risk team | 19 | (9) |
| Early warning score | 28 | (14) |
| Modified early warning score | 89 | (42) |
| Combinations of above | 8 | (4) |
| Other | 2 | (1) |
| System not specified | 4 | (2) |
| Sub-total | 153 | (73) |
| No early warning system used | 58 | (27) |
| Total | 211 | |

Track and trigger systems may stand alone and feed into the normal ward care structure or may exist in conjunction with a critical care outreach service. Outreach services have been suggested as a means of improving the care of patients since the publication of *Critical to success*¹². In this document the Audit Commission gave the 'highest priority recommendation' that acute hospitals develop an outreach service to support ward staff in managing patients who were at risk. The concept of outreach services was promoted in the publication *Comprehensive Critical Care*¹⁰ and has been subsequently further supported by the Royal College of Physicians⁷. Furthermore, Alan Milburn (then Secretary of State for Health) recommended that "we should see outreach services developing in every hospital"²⁹. However, the development of outreach services has been largely unplanned and is not uniform as Table 6 shows. It is of concern that there appears to be a great disparity between England and the rest of the areas covered by NCEPOD with respect to the provision of outreach.

| Table 6. Outreach services available in the United Kingdom | | | | | |
|--|-----------------|----------------|------------|--------------|------------|
| Outreach service | | | | | |
| Country | Yes (%) | No (%) | Sub-total | Not answered | Total |
| England | 108 | 65 | 173 | 2 | 175 |
| Independent hospitals | 5 | 7 | 12 | 1 | 13 |
| Wales | 3 | 9 | 12 | 0 | 12 |
| Northern Ireland | 0 | 9 | 9 | 0 | 9 |
| Guernsey | 0 | 1 | 1 | 0 | 1 |
| Isle of Man | 0 | 1 | 1 | 0 | 1 |
| Total | 116 (56) | 92 (44) | 208 | 3 | 211 |

Recommendations

- A clear physiological monitoring plan should be made for each patient. This should detail the parameters to be monitored and the frequency of observations.
- Part of the treatment plan should be an explicit statement of parameters that should prompt a request for review by medical staff or expert multidisciplinary team.
- The importance of respiratory rate monitoring should be highlighted. This parameter should be recorded at any point that other observations are being made.
- Education and training should be provided for staff that use pulse oximeters to allow proper interpretation and understanding of the limitations of this monitor. It should be emphasised that pulse oximetry does not replace respiratory rate monitoring.