

4. Pre-ICU care

Time between first physiological instability and referral to ICU

Even with appropriate review and intervention, some patients will continue to deteriorate. This decline needs to be rapidly recognised to allow optimal management. To assess the rapidity of response to continued deterioration the casenotes and charts were reviewed against a standardised list of physiological abnormalities (Table 7) ^{17,18}. These are criteria commonly used as medical emergency team calling criteria and were used to quantify the time delay between each patient first triggering one of these criteria and subsequent referral to critical care.

Table 7. Standardised list of physiological abnormalities used in assessing the rapidity of response to continued deterioration
Clinical criteria
Cardiorespiratory arrest
Respiratory rate: <8 breaths per minute
Respiratory rate: >30 breaths per minute
SaO ₂ <90% on oxygen
Difficulty speaking
Pulse rate: <40 beats per minute
Pulse rate: >130 beats per minute
Systolic blood pressure <90mmHg
Repeated or prolonged seizures
Any unexplained decrease in consciousness
Agitation or delirium
Concern about patient status not detailed above

As can be seen from Figure 1, there were considerable time delays between gross physiological instability and subsequent ICU referral for the 162 cases where data was available. This graph shows data for patients who had an inpatient stay of greater than 24 hours prior to admission to ICU.

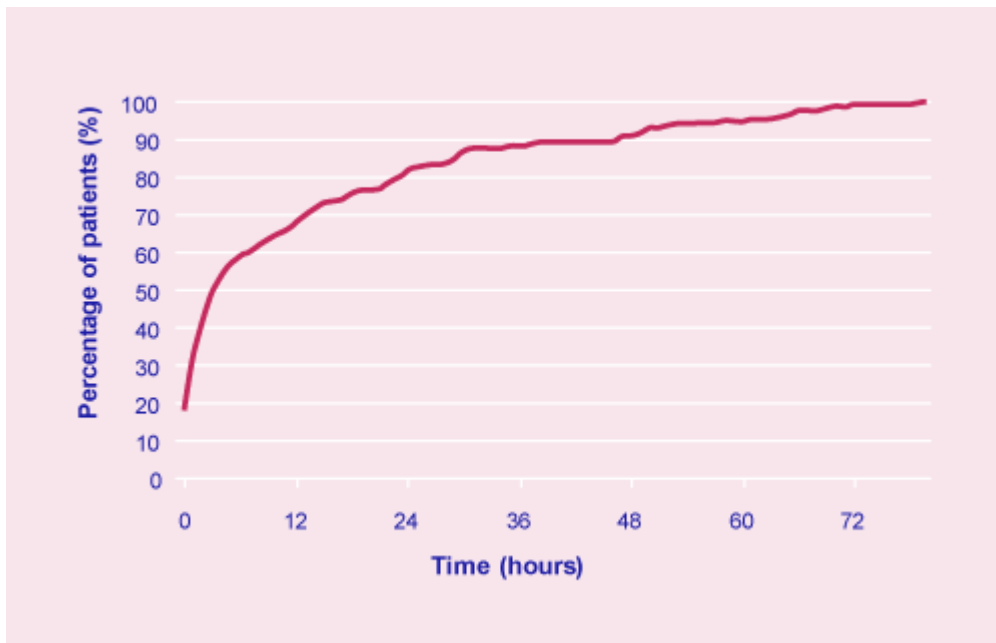


Figure 1. Time between gross physiological instability and subsequent referral to ICU $n=162$

Of these patients, 66% had clearly identifiable gross physiological abnormalities for greater than 12 hours prior to referral to ICU.

Deterioration in the group of patients who were in hospital for 24 hours or less prior to ICU admission appears to have been more rapidly recognised, with only 6% having clearly identifiable gross physiological abnormalities for greater than 12 hours prior to referral to ICU.

A recent study has looked at antecedent factors prior to cardiac arrest, death or emergency admission to ICU in a sample of hospitalised patients¹⁹. Whilst the patient population is different, this study shows that a high proportion of patients have recognisable physiological derangement prior to an adverse event. Indeed, 60% of patients had antecedent factors prior to cardiac arrest, death or emergency admission to ICU.

An earlier study also produced very similar findings. In over 60% of patients admitted to intensive care potentially life-threatening abnormalities were documented during the eight hours before their admission²⁰.

It is clear from the above that there are problems with the recognition of deteriorating patients and the level of senior input. NCEPOD has previously found similar problems with lack of recognition of severity of sickness and of low levels of consultant input into emergency care in both surgery and anaesthesia^{21,22}. Despite the considerable changes in the structure of acute care in recent years, the findings in this study relating to recognition of severity of illness and consultant supervision are remarkably similar to this previously published work.

Although the data are difficult to collect, the apparently low involvement of consultant physicians both in the first 24 hours of admission and in the critical phase of patient care prior to ICU admission are concerning. Virtually all consultant physicians have their major commitment in time and their major strength in expertise in a specialty, such as gastroenterology or cardiology (which often carries in itself a significant out-of-hours workload) and it is difficult for them to devote the time both to the practice of acute medicine and to keep up to date²³. This has led the Royal Colleges of Physicians to advocate the development of acute medicine as a specialty⁸. NCEPOD supports this, and there are already well over a hundred acute physicians in practice in this country dedicated to the management of the 'unselected medical emergency admission'. Patients are triaged to other medical specialists according to need. However, it may take up to a decade for this pattern of care to reach its potential, and until then it is essential that consultant physicians have job

plans that allow sufficient time to commit to the care of acutely ill medical patients and have continuing professional development dedicated to this. While they may be unlikely to be able to maintain the full range of practical skills themselves, they should have sufficient authority to ensure that management plans are delivered speedily and by the appropriate team members.

It is often said that physiological derangement is common in emergency admissions to hospital and that a significant number of these patients make a full recovery. Whilst this is undoubtedly true it must be remembered that physiological derangement is a marker of poor outcome and that there is a good correlation between the number of physiological abnormalities and subsequent mortality. In a recent study it was found that mortality increased with the number of physiological abnormalities ($p < 0.001$), being 0.7% with no abnormalities, 4.4% with one, 9.2% with two and 21.3% with three or more²⁴. It is therefore imperative that patients exhibiting physiological abnormalities receive prompt and appropriate interventions and receive early input from senior doctors.

Case study

A patient in their mid-seventies was admitted as an emergency with diarrhoea and general malaise. The only significant past medical history was hypertension, treated with an ACE inhibitor. On admission they were noted to be dehydrated, with a blood pressure of 110/60 mmHg and a pulse rate of 100 beats per minute. Their respiratory rate was measured at 36 breaths per minute. Serum creatinine was 154 $\mu\text{mol/l}$. They were admitted by the medical SHO who prescribed intravenous fluid (1,000mls over 8 hours) and antibiotics. The impression noted in the admission clerking was “? infection”. Four hours after admission the BP was noted to be 85/50 mmHg. Maintenance intravenous fluids (3000mls) were prescribed and given over the next 24 hours despite the low blood pressure that persisted. In the first 24 hours after admission the nursing staff requested medical staff review on five occasions. Four of these reviews were by the PRHO and one by the SHO. Despite continuing hypotension no additional therapy was instituted. One entry (24 hours after admission) by the PRHO states that the blood pressure is 70/30 mmHg but that the patient appears stable. Analysis of blood gases at that time revealed the following; pH 7.31, PaCO₂ 3.7 kPa, PaO₂ 13.5 kPa, base excess -11.1 mmol/l, lactate 4.3 mmol/l. At that time urine output was noted to be negligible. SHO review confirmed these findings and the differential diagnosis of septic shock was made. An additional 500 mls of colloid were infused over the next two hours. No other treatment was initiated nor advice sought. The patient remained hypotensive, tachypnoeic and confused overnight. The patient was reviewed by the SHO on several occasions, with no changes to treatment. Indeed one nursing entry states “Dr. not unduly worried at present – continue with present regime”. A deterioration in consciousness at 48 hours after initial hospital admission prompted referral of the patient to the outreach service. At this point the patient was more acidotic, tachypnoeic and shocked. Admission to the ICU was expedited but despite initiation of organ support the patient continued to deteriorate and died 12 hours after ICU admission.

It is clear that the PRHO and SHO did not appreciate the significance of the physiological derangements in this patient nor the clinical urgency of the situation. Earlier, more adequate resuscitation may have prevented the deterioration in this patient.

Case study

A patient in their mid-fifties was admitted to the hospital as an emergency surgical admission with a diagnosis of acute pancreatitis probably related to chronic high alcohol intake. They were managed on a surgical ward for five days where it was noted that their pancreatitis seemed to be resolving and the problems became primarily related to decreased conscious level and confusion and tachypnoea. At this point physician input was sought and after an SpR review the patient was transferred to the care of the medical team for further management. The patient became more drowsy and hypoxic over the next twelve hours. In the first 24 hours after transfer to the medical team he was seen once by an SpR and twice by an SHO – both noted the deterioration but no therapy was instituted. Outreach review occurred 18 hours after transfer to the medical team. The outreach team noted the physiological

disturbances and suggested “urgent senior medical review”. Later that evening (now 36 hours after transfer of care) the nursing staff were concerned about the continued deterioration of the patient and the high MEWS score and asked the night nurse practitioner to review. The nurse practitioner confirmed the urgency of the situation and asked for advice from the PRHO and outreach team. No more senior advice was sought. By the next morning, the patient was unrousable, hypotensive and tachypnoeic. The SpR in medicine sought urgent assistance from critical care at this point. Despite ICU admission and supportive care the patient died 48 hours later.

This patient was transferred to the care of the medical team as, despite improvements in the pancreatitis, they developed a worsening conscious level and respiratory dysfunction. They remained on the medical ward for 48 hours prior to ICU admission and were not seen by a consultant physician. Earlier input of a senior doctor should have occurred.