

4. Pre-ICU care

Key findings

- The quality of the initial hospital admission history and examination was acceptable in 90% of cases. It is worrying that one in 10 patients have an incomplete history and examination.
- Despite an acceptable history and examination, initial treatment was often delayed, inappropriate or both.
- Although the data are difficult to collect from casenotes it seems likely that, despite RCP recommendations, consultant physician involvement in the first 24 hours remains low. Data were available to assess the timing of patient review by a consultant physician in just 40 of the 439 deaths for which casenotes were available. Amongst these 40 cases, a consultant physician did not review 17 patients within 24 hours of admission to hospital.
- Patients often had prolonged periods of physiological instability prior to admission to ICU. In patients who had been in hospital more than 24 hours prior to ICU admission, 66% exhibited physiological instability for more than 12 hours.

Introduction

The medical notes relating to the initial admission (defined as up to, but not including the post-take ward round) were analysed by the NCEPOD advisors. Due to data protection requirements, notes were only requested in cases where the outcome was death within the study period. Of the 560 patients who died, 439 sets of notes were available to the advisor groups (78%).

Admission history

The advisors found that overall the initial history, examination, differential diagnosis and treatment planning was of an acceptable standard (Tables 1-4). In one in 10 cases the initial history and examination was judged to be unacceptable or incomplete by the advisors and no initial treatment plan could be identified. In addition to the assessment of clinical examination and history, the standard of care given in the initial period after hospital admission was scored using the system given in Table 5. 58% of cases were classified as receiving prompt and appropriate therapy. It is concerning that up to 42% of cases received inappropriate or delayed therapy. Frequent examples were the use of inappropriately low concentrations of oxygen in profoundly hypoxic patients and the delayed administration of sufficient fluids to hypotensive patients. These findings reveal that despite a largely adequate hospital admission process (history, examination, diagnosis and plan) there are concerns over timely and appropriate interventions. The reasons for this are not clear but may include organisational factors which introduce delays into treatment plans and the reliance on doctors still undergoing training to initiate the correct therapy and drive care forward. It may be felt that the advisors were being particularly harsh and being wise after the event. However, the findings of deficiencies in history, examination, treatment planning and initial therapy were much worse in a similar study performed recently³ and we feel confident that the level of deficiency has not been overstated.

Table 1. Standard of history taken		
Acceptable history taken	Total	(%)
Yes	312	(90)
No	33	(10)
Sub-total	345	
Insufficient data	94	
Total	439	

Table 2. Completion of clinical examination		
Clinical examination complete at first contact	Total	(%)
Yes	297	(87)
No	43	(13)
Sub-total	340	
Insufficient data	99	
Total	439	

Table 3a. Diagnosis at initial review		
Diagnosis reached at initial review	Total	(%)
Yes	326	(93)
No	24	(7)
Sub-total	350	
Insufficient data	89	
Total	439	

Table 3b. Accuracy of diagnosis		
Diagnosis correct	Total	(%)
Yes	276	(90)
No	30	(10)
Sub-total	306	
Insufficient data	20	
Total	326	

Table 4a. Initial treatment plan made		
Initial treatment plan made	Total	(%)
Yes	299	(87)
No	46	(13)
Sub-total	345	
Insufficient data	94	
Total	439	

Table 4b. Initial treatment plan followed		
Treatment plan followed	Total	(%)
Yes	269	(96)
No	11	(4)
Sub-total	280	
Insufficient data	19	
Total	299	

Table 5. Standard of care during the initial period following admission		
Appropriateness of the treatment	Total	(%)
Prompt and appropriate	253	(58)
Prompt but inappropriate therapy	28	(6)
Appropriate but apparent delay	35	(8)
Inappropriate and delayed	28	(6)
Insufficient information to comment	95	(22)
Total	439	

In addition to the initial medical admission, we sought to collect information about medical staff involvement; specifically the grade of medical staff that reviewed the patients and the time delay from admission to first consultant physician review. Unfortunately the quality of the medical records was such that this information was difficult to obtain. There were 2,234 reviews among 439 patients. The grades of the reviewers were recorded in only 37% of reviews. Table 6 shows the grade of medical staff that undertook patient reviews in the three days prior to ICU admission. As can be seen, more than 50% of patient reviews were performed by PRHOs or SHOs.

Table 6. Grade of patient reviewers in the three days prior to ICU admission		
Reviewer grade	Number of reviews	(%)
Consultant	96	(8)
Registrar	458	(36)
Staff Grade / Associate Specialist	25	(2)
SHO	558	(44)
PRHO	147	(11)
Sub-total	1,284	
Not recorded	950	
Total (amongst 439 patients)	2,234	

First consultant review

Time to first consultant review was poorly recorded. Of the 439 sets of notes reviewed we were only able to extract this information in 40 cases. A consultant physician reviewed 23 of the 40 patients (58%) within 24 hours of admission to hospital. 28 of these 40 patients had a ward stay of greater than 24 hours prior to ICU admission (and therefore had a greater potential to be reviewed within 24 hours). A consultant physician reviewed 11 of these 28 patients (39%) within 24 hours of admission to hospital. The Federation of the Royal Colleges of Physicians of the UK recommend that 90% of acute admissions should be reviewed by a consultant within 24 hours⁹, and the recommendations contained in *Acute medicine: making it work for patients* states that all patients should be reviewed by a consultant within 24 hours⁸. From the limited data available it appears that care is not reaching this standard, although caution should be exercised due to the large number of casenotes not amenable to study due to poor record keeping.

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.

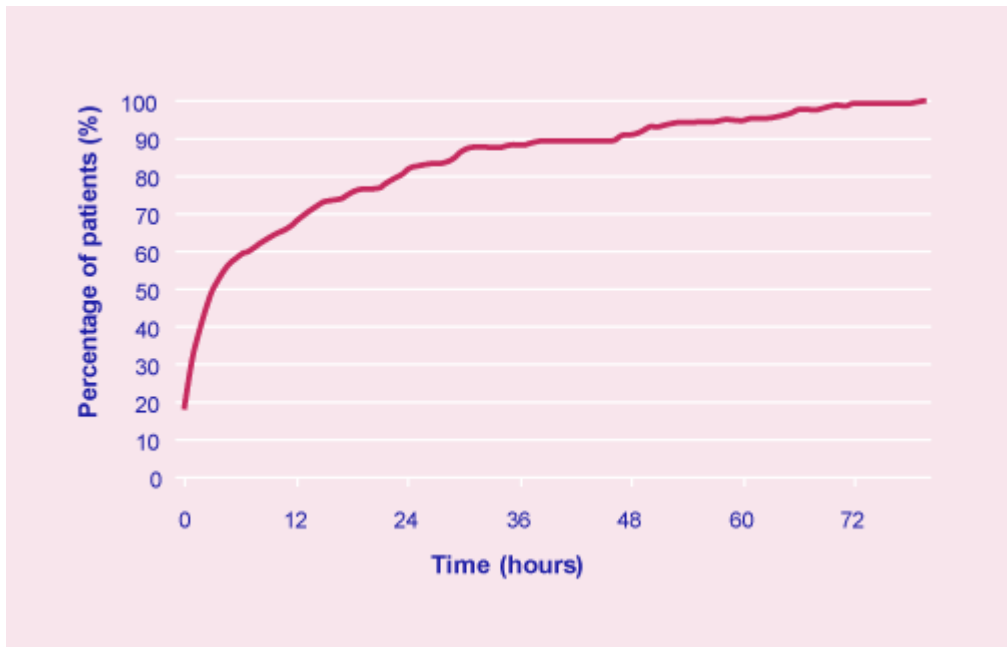


Figure 1. Time between gross physiological instability and subsequent referral to ICU *n*=162

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.

Recommendations

- Trusts should ensure that consultant job plans reflect the pattern of demand of emergency medical admissions and provision should be made for planned consultant presence in the evenings (and perhaps at night in busier units).
- A consultant physician should review all acute medical admissions within 24 hours of hospital admission ⁸. Regular audit should be performed against this standard.
- Trusts should ensure that consultant physicians have no other clinical commitments when on take. This may be through the development of acute physicians ⁸. This will allow for greater involvement in the assessment and treatment planning of new admissions and the review of deteriorating inpatients.
- More attention should be paid to patients exhibiting physiological abnormalities. This is a marker of increased mortality risk.
- Robust track and trigger systems should be in place to cover all inpatients. These should be linked to a response team that is appropriately skilled to assess and manage the clinical problems.