Avoidable cardiac arrest: lessons for an A&E department

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Deterioration to cardiac arrest is not always sudden and unexpected and on a significant number of occasions cardiac arrest could be prevented. This has important messages for the Accident and Emergency (A&E) department as the vast majority of emergency admissions originate via A&E.

Keywords: Cardiac arrest; Sudden cardiac deaths; Medical emergencies

Introduction

There is a tendency to believe that cardiac arrest is something that ‘just happens’ but sadly this is far from the truth and some cardiac arrests are potentially avoidable. It has recently been identified that ‘lodged’ patients in the Accident & Emergency (A&E) department are at higher risk for cardiac arrest (Huang et al. 2002). Lodged patients are now commonplace in many A&E departments throughout the United Kingdom and many spend a prolonged period of time there (Mills 2003). These factors increase the risk of avoidable cardiac arrest in the emergency department (ED) and work-load tends to result in patients being admitted to inappropriate clinical areas.

Cardiac arrests can be sub-divided into two distinct groups. The first are sudden cardiac deaths and the second are cardiac arrests secondary to acute deterioration following acute or chronic illness.

Sudden cardiac death, by its very nature is very difficult to prevent, as it typically occurs in the early phase of acute myocardial infarction and tends to occur in the community. However, acute deterioration in-hospital following acute or chronic illness is often detectable and may be preventable. In an expert panel review of ITU admissions McQuillan et al. (1998) found that sub-optimal care was frequently present prior to ITU admission.

A research project involving the authors investigated avoidable cardiac arrest and highlighted further failings in initial patient management that often resulted in critical deterioration and cardiac arrest (Hodgetts et al. 2002a).

This paper discusses the authors’ findings in relation to the A&E environment, focusing on the issue of potentially avoidable deterioration resulting in cardiac arrest (Hodgetts et al. 2002a, 2002b). We believe there are cases of avoidable cardiac arrest occurring in the A&E department as indicated in the example, Fig. 1. Moreover, practice and treatment strategies initiated in the A&E department may also reduce avoidable cardiac arrest occurring amongst the general ward population, as the majority of acute admissions originate via A&E.

Methodology

The setting was an acute district general hospital in southeast England with 700 beds. Subjects were all adult patients suffering...
in-hospital cardiac or respiratory arrest where resuscitation was attempted for the calendar year 1999. Case-notes for this cohort \((n = 132)\) were collated and reviewed by an A&E trained research nurse (GK). A detailed summary of patient records, nursing notes, test reports and charts was presented to an expert panel for review. The expert panel consisted of a professor of emergency medicine, consultant in general medicine/cardiology, consultant intensivist/anaesthetist, and a resuscitation officer with critical care nursing background. McQuillan et al. (1998) adopted a similar approach.

The expert panel was tasked with quantifying the incidence of avoidable cardiac or respiratory arrest and identifying factors contributing to the arrest. Wherever possible unanimous agreement was sort but where this was not possible consensus agreement was obtained.
The identification of risk factors for cardiac arrest informed the development of a scoring tool, used to alert an acute response team (the Medical Emergency Team or MET). The aim of MET is to prevent patients deteriorating to cardiac arrest by instigating a senior review when risk factors are present (Hodgetts et al. 2002a).

Results and discussion

The expert panel judged that over 60% of cardiac arrests occurring in general ward areas were potentially avoidable (Hodgetts et al. 2002a). All patients suffering avoidable cardiac arrest had physiological abnormalities present in the hours before cardiac arrest particularly: tachypnoea, hypotension, tachycardia and reduced level of consciousness (Hodgetts et al. 2002a).

Other factors that contributed to avoidable deterioration included the absence of senior doctor review, poor patient monitoring, failure to follow best evidence for treatment and patients being placed in the wrong area for their clinical problem (Hodgetts et al. 2002a, 2002b).

Many of the causes of avoidable cardiac arrest on general ward areas, and measures to prevent it, are applicable to the A&E setting but have not yet been considered (Table 1). The strategies outlined in Table 1 might also reduce some general ward arrests if implemented earlier in the patients’ journey, perhaps even before they reach the ward. The low success rate associated with cardiac arrest suggests this is a clinical situation deserving of our attention (Gwinnutt et al. 2000). These findings are discussed in relation to the A&E setting.

<table>
<thead>
<tr>
<th>Factors contributing to avoidable cardiac arrest</th>
<th>A&amp;E impact</th>
<th>Specifics</th>
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<tbody>
<tr>
<td>Poor patient monitoring</td>
<td>Yes</td>
<td>Respiratory rate is rarely recorded in A&amp;E</td>
</tr>
<tr>
<td>Error of diagnosis or inadequate treatment</td>
<td>Yes</td>
<td>Treatment protocols and care pathways</td>
</tr>
<tr>
<td>Admission to an inappropriate clinical area</td>
<td>Yes</td>
<td>High bed occupancy means less choice</td>
</tr>
<tr>
<td>(including A&amp;E observation areas)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrequent use of Do Not Attempt Resuscitation orders</td>
<td>Yes</td>
<td>DNAR guidelines for A&amp;E See <a href="http://www.resus.org.uk">www.resus.org.uk</a></td>
</tr>
<tr>
<td>Inadequate preparation of junior nurses &amp; HCAs</td>
<td>Yes</td>
<td>Role preparation for HCAs lacks standardisation. Increased supervision of newly qualified nurses to include a formal period of perceptorship</td>
</tr>
</tbody>
</table>

Vital signs: the importance of counting the respiratory rate

A&E nurses are well versed in recording and interpreting patients’ vital signs but how often do we record the patient’s respiratory rate? And have vital signs ‘out-side’ of the resuscitation or triage room become just routine observations to be done by support workers or not done at all if the patient is a GP ‘lodge’ and the department is overwhelmed.

Abnormal respiratory rate or a change in breathing pattern (often documented as ‘short of breath’ or SOB in the case notes) is commonly associated with impending deterioration and this may occur earlier than changes in other vital signs (Hodgetts et al. 2002a, 2002b). The importance of respiration as a predictor of deterioration was also noted by Fieselman et al. (1993) who reported that patients may demonstrate an increase in respiratory rate up to 2 days prior to critical deterioration. These findings confirm the need for respiratory rate to be recorded routinely when monitoring patients, as trends in vital signs provide better indicators of change than ‘single’ snapshots of vital sign parameters.

Despite these findings respiratory rate was infrequently recorded by either medical or nursing staff within the study hospital (Kenward et al. 2001). In fact, patients’ bowel habits were more commonly recorded than respiratory rate. A failure to record respiratory rate is not restricted to the study hospital, or indeed to ward nurses (Alcock et al. 2002).

Support workers

Increasingly duties previously performed by qualified nurses or nurses in training (prior to project 2000) are undertaken by Health Care
Assistants (HCAs). Arguably this reflects both a shortage of trained staff and the changing role of the qualified nurse. The extension of support workers into critical care areas continues and the A&E department is no exception. Our research did not directly review the impact of HCAs on the quality of patient monitoring and outcomes. However, other studies have suggested an association between increasing in-hospital mortality and the employment of less qualified staff, such as junior nurses and HCAs (Jarman 2000).

Furthermore the recent work by Needleman et al. (2002) has further demonstrated the influence of qualified nursing staff on the level of patient care delivered. Benefits include a reduction in clinical deterioration (including cardiac arrest) and shorter in-patient stays.

These findings suggest that poor preparation of support workers, and for that matter newly qualified nurses, may impact on patient morbidity and mortality in the A&E department. Whilst education remains the cornerstone of preparing and developing support workers and junior staff in A&E, clinical supervision is also essential (Garrard & Young 1998). It must, however, be remembered that clinical supervision is dependent on the availability of experienced nurses as well as departmental workload.

In addition, certain clinical areas within the A&E department, such as triage and the resuscitation room, must remain the domain of the specialist-qualified nurse to ensure effective patient assessment and management. Junior nurses and HCA’s do have a place in these areas but only where there are sufficient senior nurses to ensure effective supervision and support thus ensuring high levels of care as well as an effective learning experience.

**Error in diagnosis or inadequate treatment**

Emergency care is often left to junior doctors with varying degrees of experience supported by nursing staff who may also be junior and equally inexperienced. This situation is being further worsened by changes in junior doctor working patterns.

Common errors that contributed to avoidable arrest in our research included misinterpretation of 12-lead ECG’s and arterial blood gases (case study), misdiagnosis of chest X-rays, resulting in inadequate or inappropriate treatment (Hodgetts et al. 2002a). This situation is a key area for improvement and an area where experienced A&E/critical care nurses can excel.

Many aspects of emergency care can be protocolised and contained within ‘care pathways’ thereby supporting the junior doctor as well as assisting the senior nurse to deliver prompt emergency care (Department of Health (DoH 2001)).

A good example of where adherence to established protocols could have reduced avoidable cardiac arrest can be seen in our enclosed case study. Adherence to the ‘Asthma treatment guidelines’ would have identified both the severity of the illness and directed appropriate care (Thorax 1997).

This requires a change from the previous emphasis on making a ‘formal’ diagnosis and requires emergency care staff to concentrate on ‘patient centred problems’ and the creation of problem centred treatment plans. The emphasis therefore needs to be placed on prompt aggressive patient management dealing with the obvious problem whilst striving to diagnose/identify the other under-lying problems. To do this effectively the initial management of common medical and surgical emergencies need to be standardised, but protocols must be up-dated annually and therefore they must be dynamic. Treatment protocols developed by the research team can be found at www.metproject.org.uk

**Support from additional expert resources**

A&E departments have striven to reduce missed-fractures through the use of ‘hot X-ray’ reporting and ‘red dot systems’ for radiographer identified fractures. However, a similar system does not exist for chest X-rays. This is an area of improvement that is going to be difficult to achieve as both radiographers and radiologists are currently in short supply (DoH 2001).

**Admission to an inappropriate clinical area**

Prolonged trolley waits and patients lodged in A&E corridors have done little for staff moral
or patient care (Mills 2003). It has also led to a culture where a ‘hospital bed is a bed, no matter where the bed is situated’.

Bed shortages increase the likelihood of admissions to inappropriate care areas, such as medical patients on surgical wards and patients on general wards who require a higher level of care (typically CCU in our study). Our research demonstrated that such patients are almost 13 times more likely to suffer an avoidable cardiac or respiratory arrest (Hodgetts et al. 2002a). Furthermore, patients admitted to inappropriate clinical areas tend to stay in-hospital longer, thereby compounding the situation of bed shortages. Whilst A&E is not the appropriate place for patients to be ‘lodged’, senior A&E staff should, as far as practicable, try to ensure patients are not placed inappropriately.

The Reforming Emergency Care (DoH 2001) document emphasises timed targets for moving patients towards once a decision to admit has been made. Although this is to be congratulated hospitals must also strive to ensure that the balance of in-hospital beds meets the demand to prevent the admission of patients to inappropriate care areas.

Patient scoring (scoring systems as a tool to predict deterioration)

Numerous scoring systems are emerging in the UK to help predict and prevent clinical deterioration; most are based on an empirical model devised in Australia some ten years ago (Hourihan et al. 1995). The aims are to record changes in vital sign parameters and, via a weighted point system, identify ‘at risk’ patients early so that an acute clinical response can be activated. There is limited evaluation of such tools within the A&E setting, but in view of the increasing length of stay of patients in A&E departments such a tool may have utility.

The aim of our scoring system was to facilitate access to a medical emergency team (MET) in order to escalate the care of ward-based patients. This in itself may not always be appropriate within the A&E department as medical support is available 24-hours a-day and the department is staffed by critical care nurses. However, patients do deteriorate and escalating patient care, particularly for lodged patients, can be challenging if the admitting team are busy elsewhere within the hospital.

A further benefit of using a scoring system for A&E patients is improved monitoring, emphasizing the importance of vital signs as a patient assessment/monitoring tool as well as providing early detection of deterioration. An additional benefit of regular patient scoring is to establish a norm prior to transfer to an in-patient ward area, thereby assisting ward staff to identify further deterioration.

In addition to providing a ‘patient centred clinical score’ the MET scoring system also identifies (by increasing or decreasing points) the gravity of a bio-chemical change. This is particularly important with regards blood gas analysis where we often noted incorrect interpretation of blood gases resulting in inappropriate or delay in patient management.

Inter-disciplinary communication can also be improved by the use of a physiological scoring tool. To produce a score the nurse must first undertake an assessment of vital signs and identify what new symptoms are giving cause for concern. This process allows for a more detailed and credible communication between the nurse and doctor when the nurse is concerned about a patient’s condition.

Do not attempt resuscitation

A sound do not attempt resuscitation (DNAR) policy is vital if patients are to be allowed to die with dignity and crash teams are not to be called to obviously futile resuscitation attempts.

Although such decisions can be made in the A&E department they are fraught with difficulties due to a lack of information. However, when adequate information is available, plus a senior clinician, then an appropriate decision should be accurately documented.

It is noteworthy that there needs to be a significant change with regard to how DNAR decisions are made, particularly with the role of relatives/next-of-kin/life-partners. Typically clinicians have devolved some (if not nearly all) of the final decisions with regard to resuscitation status to relatives and yet they are neither empowered nor often emotionally able to make such decisions. (www.resus.org.uk)
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Therefore to avoid the delays and to minimise the occasional conflict that is associated with involving relatives directly within DNAR decisions we need to concentrate on making the right decisions (on clinical grounds) and communicate these decisions to the relatives. It is worth reiterating that DNAR does not equal ‘do not treat’ and that 14% of such patients may be discharged home. (Unpublished thesis.)

The critically ill patient

Key lessons highlighted by the MET project is the importance of vital signs as trends, the role of respiratory rate and the importance of an experienced qualified nurse’s instincts that her patient is unwell even when the ‘numbers’ tend to suggest the opposite.

Conclusion

A significant number of in-hospital cardiac arrests are at least potentially avoidable and the lessons learnt by researching in-hospital cardiac arrests is readily transferable to the A&E department. Applying a physiological scoring tool in A&E may improve patient monitoring, increase inter-disciplinary communication and, through the use of evidence-based treatment protocols, improve patient care.

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