SHORT REPORT

Variations in the provision of resuscitation equipment: survey of acute hospitals

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Background: There are wide variations in survival after cardiopulmonary resuscitation. The aim of this survey was to describe how equipment provision of resuscitation trolleys was deployed in a range of clinical ward areas.

Methods: The equipment in randomly selected resuscitation trolleys in all 14 South West Thames Region hospitals was surveyed. The gold standard for equipment provision was referenced from the document *CPR Guidance for Clinical Practice and Training in Hospital*.

Results: There were significant differences in the provision of circulation equipment ($p=0.004$) and in the rates of drug items present ($p=0.001$). There was no significant difference in provision of airways equipment ($p=0.24$) or immediate access items ($p=0.55$).

Conclusions: There are variations in the provision of resuscitation equipment in many clinical areas. Hospitals need to review the procedures for ensuring adequate provision of resuscitation equipment in all clinical areas.

There is evidence that there are wide variations in patient survival after cardiopulmonary resuscitation (CPR) nationally, with the best outcomes achieved in accident and emergency (A&E), coronary care (CCU), and other specialised units.¹ The BRESUS study stated that 71% of mortality at one year, in patients undergoing attempted resuscitation, occurred during the initial cardiac arrest, pointing to opportunities to improve outcome through appropriate training and coordination of the resuscitation team.¹ Although the rational use of drugs and defibrillation in resuscitation has been standardised according to national and international guidelines, there had been no such standardisation of resuscitation equipment, until recommendations were given by the Resuscitation Council in 2001.² To begin to improve outcomes for patients undergoing CPR, information is required on the availability of relevant resuscitation equipment on cardiac arrest trolleys. This survey was conducted therefore to identify the variation in provision of resuscitation equipment in different clinical ward areas in a number of acute hospitals in the South West Thames Region.

METHODS

This study surveyed the equipment in selected resuscitation trolleys in all 14 South West Thames Region hospitals (SWT) between October 2002 and May 2003. The gold standard for the equipment that should be present was referenced from the appendix of the document *CPR Guidance for Clinical Practice and Training in Hospital*.²

The survey was performed on the resuscitation trolley of a medical, surgical, care of the elderly, obstetric and gynaecology ward (each chosen at random), together with CCU and A&E in each hospital.

Figure 1 Percentage availability of resuscitation equipment in acute hospitals according to clinical area (mean (SEM)).

The items recommended in the guidelines were divided into four groups:

Airways equipment: 19 items ranging from endotracheal tubes to lubricating jelly.

Circulation equipment: eight items ranging from intravenous cannulas to Seldinger wire central line kits.

Drugs: three drugs should be immediately available in prefilled syringes; adrenaline 1 mg (1:10 000) ×4, atropine 3 mg ×1, amiodarone 300 mg ×1, and a further 15 should be readily available, ranging from magnesium to normal saline flushes.

Immediate access: seven items listed including blood gas syringes, and an ECG machine.

Items of equipment were scored as being present (1) or absent (0), and then described as a percentage of the recommended number in each of the four groups.

A Kruskal-Wallis analysis of variance was used to compare the percentage of equipment present on each trolley in the different clinical areas expressed as a mean with the standard error of the mean.

Abbreviations: A&E, accident and emergency; CPR, cardiopulmonary resuscitation; CCU, coronary care unit

RESULTS

Figure 1 shows the results. There was a significant difference in the percentage of circulation equipment present ($p = 0.004$) in the six different clinical areas surveyed, with the highest rates in A&E (mean (SEM) 59 (6.03)%) and CCU (mean 43 (3.4)%). The lowest rates were seen in obstetric and gynaecology wards (mean 30.2 (4.3)%) followed by medical wards (mean 35.4 (3.4)%) and care of the elderly wards (39.4 (3.7)%).

There were also significant differences in the percentage of drug items present ($p = 0.001$). The highest rates areas were seen in CCU (mean 91.2 (2)%), and A&E (mean 86.9 (4.3)%), with lower rates found in obstetric and gynaecology (65.8 (3.4)%), care of the elderly (66.3 (2.8)%), and surgical wards (mean 66 (4.4)%).

There were no significant differences in the percentages of airways equipment ($p = 0.24$) or immediate access items ($p = 0.55$) present in the clinical areas. Highest rates of immediate access items were seen in CCU (98.8 (1.1)%) while the lowest seen in surgical wards (91.9 (4.1)%). Similarly highest rates of airways equipment were found in CCU (80.2 (2.1)%) while lower rates were seen in care of the elderly wards (71.8 (3.4)%) and obstetric and gynaecology wards (70.6 (3.7)%).

DISCUSSION

This is the first survey to date to describe in detail the availability of relevant resuscitation equipment in cardiac arrest trolleys using the gold standard benchmark.² There were pronounced variations in the availability of circulation equipment and drug items in the different clinical areas of the 14 hospitals surveyed. Although the highest rates of provision were seen in A&E and CCU, the availability of resuscitation equipment was still suboptimal in these areas where a large proportion of cardiac arrests occur.¹ Availability of equipment was consistently poor in surgical, obstetric wards, and care of the elderly wards.

A number of studies have shown that younger age predicts better survival.⁴⁻⁵ Poor provision of equipment in elderly care wards may therefore be a reflection of a seemingly poor prognostic category even though there is increasing evidence that cardiopulmonary resuscitation is indeed effective for selective octogenarians.⁶ The low levels of equipment found in obstetric and gynaecology wards might also be a result of the case mix of patients managed in this setting where low rates of cardiac arrests would be expected to occur. Infrequent checks on resuscitation trolleys may also be responsible for driving these variations. King and colleagues showed that in 32 cardiac arrest trolleys, 9% had significant deficiencies, which included inadequate checks as well as being situated in geographically inappropriate places such as in patient waiting areas.³

To improve outcomes after cardiac arrest, it is important to understand the structure and process of resuscitation. Cooper and colleagues showed that one of the independent variables associated with poor survival after cardiac arrest was having difficulties with resuscitation equipment.⁷ The unacceptable variations found in this survey may therefore have implications in the care patients are likely to receive in different

Key points

- Patient survival after CPR is variable and depends, among other things, on timely access to appropriate equipment.
- The availability of resuscitation equipment is often suboptimal even in areas such as A&E.
- This survey showed unacceptable levels of variation in resuscitation equipment in different clinical areas.
- To ensure equity of care, all hospitals should review their procedures for the provision of resuscitation equipment.

ward settings. Further analysis would be required to examine the link between equipment availability and survival after CPR to provide evidence for improving the quality and effectiveness of resuscitation.

Successful resuscitation depends upon timely access to appropriate equipment,¹ the absence of which may lead to delay or failure in CPR.³ The results of this survey suggest the need for all hospitals to review the procedures for ensuring adequate provision of resuscitation equipment in all clinical areas.

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