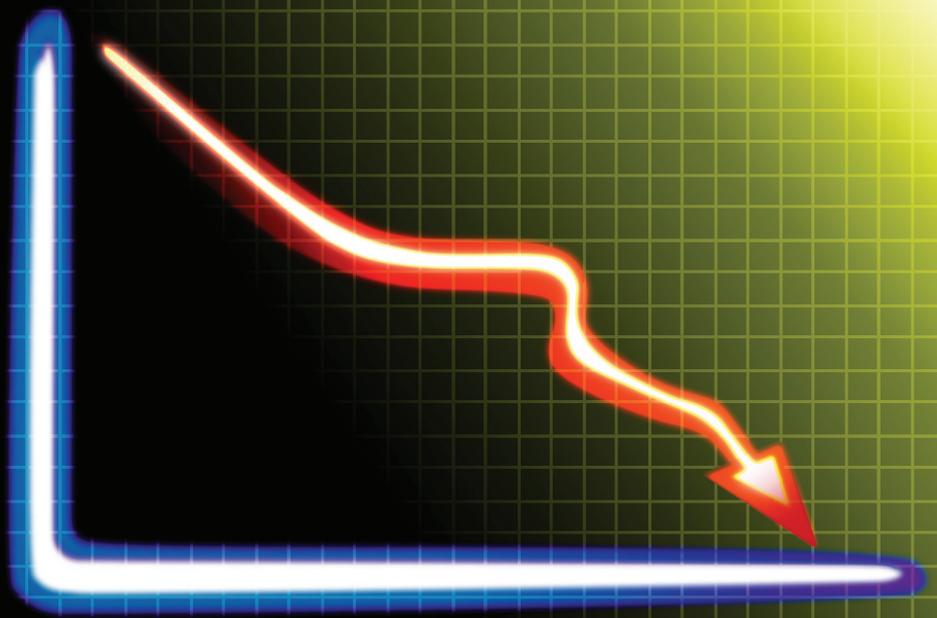


Time to Intervene?

A review of patients who underwent cardiopulmonary resuscitation as a result of an in-hospital cardiorespiratory arrest



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A review of patients who underwent cardiopulmonary resuscitation as a result of an in-hospital cardiorespiratory arrest

A report by the National Confidential Enquiry into Patient Outcome and Death (2012).

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Principal Recommendations

Patient population, initial assessment and first consultant review

CPR status must be considered and recorded for all acute admissions, ideally during the initial admission process and definitely at the initial consultant review when an explicit decision should be made in this group of patients, and clearly documented (for CPR or DNACPR). When, during the initial admission, CPR is considered as inappropriate, consultant involvement must occur at that time. *(All Doctors)*

Care before the cardiac arrest

Where patients continue to deteriorate after non-consultant review there should be escalation of patient care to a more senior doctor. If this is not done, the reasons for non-escalation must be documented clearly in the case notes. *(All Doctors)*

Resuscitation status

Health care professionals as a whole must understand that patients can remain for active treatment but that in the event of a cardiac arrest CPR attempts may be futile. Providing active treatment is not a reason not to consider and document what should happen in the event of a cardiac arrest. *(All Health Care Professionals)*

Resuscitation attempt

Each hospital should ensure there is an agreed plan for airway management during cardiac arrest. This may involve bag and mask ventilation for cardiac arrests of short duration, tracheal intubation if this is within the competence of members of the team responding to the cardiac arrest or greater use of supraglottic airway devices as an alternative. *(Medical Directors)*

Period after the cardiac arrest

Each hospital should audit all CPR attempts and assess what proportion of patients should have had a DNACPR decision in place prior to the arrest and should not have undergone CPR, rather than have the decision made after the first arrest. This will improve patient care by avoiding undignified and potentially harmful CPR attempts during the dying process. *(Medical Directors)*

Introduction

Cardiopulmonary resuscitation (CPR) of patients can be an important, life-sustaining intervention. It should be remembered that CPR was originally developed to save the lives of younger people dying unexpectedly, mostly from primary cardiac disease (the phrase 'hearts too young to die' is often used). However CPR has come to be seen as a procedure that should be used for patients as a therapy to restore cardiopulmonary function and prolong life, irrespective of the underlying cause of cardiac arrest. A high proportion of in-hospital deaths now involve CPR attempts, even when the underlying condition and general health of the patient makes success unlikely. In addition, even when there is clear evidence that cardiac arrest or death are likely, decisions about the patient's CPR status are not always documented clearly. The result is that patients may undergo futile attempts at CPR during their dying process. Improved knowledge, training, and do not attempt cardiopulmonary resuscitation (DNACPR) decision-making should improve patient care and prevent these futile and undignified procedures at the end of life. Patients for whom CPR cannot prolong life, but merely prolong the dying process should be identified early.

Rates of survival and complete physiological recovery following in-hospital cardiac arrest are poor. This applies to patients in all age groups. It has been shown that fewer than 20% of adult patients having an in-hospital cardiac arrest will survive to discharge.¹

In the large study by Meaney et al¹, the highest survival rates were found in patients who have a ventricular fibrillation (VF) cardiac arrest (37% survival to hospital discharge). The commonest underlying cause of cardiac arrest in patients having a VF cardiac arrest is primary myocardial ischaemia, however this group is the minority of patients who have an in-hospital cardiac arrest (8718/51919 (17%) of cardiac arrests studied). Most

cardiac arrests occur in patients in general ward areas and are often unmonitored. The underlying cardiac arrest rhythm is usually asystole or pulseless electrical activity (PEA), and the chance of survival to hospital discharge is extremely poor (11%).

Many in-hospital cardiac arrests are predictable events not caused by primary cardiac disease.² In this group, cardiac arrest often follows a period of slow and progressive physiological derangement that is often poorly recognised and treated.³ Identification of obvious markers of deterioration in patients who have a cardiac arrest was shown as far back as 1990 by Schein and colleagues⁴ and has been subsequently demonstrated in other publications.⁵⁻⁸ Following work by NCEPOD² the National Institute for Clinical Excellence produced clinical guidance to promote recognition and management of the acutely unwell patient (NICE CG 50).⁹ This guideline was based on the evidence of delayed recognition of illness and that intervention could improve outcomes and reduce cardiac arrest rates.¹⁰⁻¹³

It was hoped that the changes put in place as a result of NICE CG 50 would have improved processes of care for acutely ill patients and that this would be evident in patients who had a cardiac arrest.

This study was originally planned to start in 2007, however, due to the publication of NICE CG 50 and a report by the National Patient Safety Agency on recognising the acutely ill patient,¹⁴ the study was deferred to allow these documents to be embedded into practice.

NB: Throughout this report the term 'cardiac arrest' or 'arrest' will be used interchangeably to represent cardiorespiratory arrest.

1. Meaney PA, Nadkarni VM, Kern KB, Indik JH, Halperin HR, Berg RA. Rhythms and outcomes of adult in-hospital cardiac arrest. *Crit Care Med* 2010;38:101-8
2. National Confidential Enquiry into Patient Outcome and Death. An acute problem? London: NCEPOD; 2005.
3. Kause J, Smith G, Prytherch D, Parr M, Flabouris A, Hillman K. A comparison of antecedents to cardiac arrests, deaths and emergency intensive care admissions in Australia and New Zealand, and the United Kingdom--the ACADEMIA study. *Resuscitation* 2004;62:275-82.
4. Schein RM, Hazday N, Pena M, Ruben BH, Sprung CL. Clinical antecedents to in-hospital cardiopulmonary arrest. *Chest* 1990; 98(6):1388-1392
5. McQuillan P, Pilkington S, Allan A et al. Confidential inquiry into quality of care before admission to intensive care . *BMJ* 1998; 316: 1853-1858.
6. McGloin H, Adam SK, Singer M. Unexpected deaths and referrals to intensive care of patients on general wards. Are some cases potentially avoidable? *J R Coll Physicians Lond* 1999;33(3):255-259.
7. Seward E, Greig E, Preston S, et al. A confidential study of deaths after emergency medical admission: issues relating to quality of care. *Clin Med* 2003; 3(5):425-434.
8. Franklin C, Mathew J. Developing strategies to prevent in-hospital cardiac arrest: analysing responses of physicians and nurses in the hours before the event. *Crit Care Med* 1994; 22(2):244-247).
9. NICE CG 50 (2007): <http://www.nice.org.uk/nicemedia/pdf/CG50FullGuidance.pdf>
10. Bellomo R, Goldsmith D, Uchino S, Buckmaster J, Hart GK, Opdam H, Silvester W, Doolan L, Gutteridge G. A prospective before-and-after trial of a medical emergency team. *Med J Aust* 2003; 179(6):283-287.
11. Chan PS, Khalid A, Longmore LS, Berg RA, Kosiborod M, Spertus JA. Hospital wide code rates and mortality before and after implementation of a rapid response team. *JAMA* 2008;300:2506-13.
12. Hillman K, Chen J, Cretikos M, et al. Introduction of the medical emergency team (MET) system: a cluster-randomised controlled trial. *Lancet* 2005;365:2091-7.
13. Harrison DA, Gao H, Welch CA, Rowan KM. The effects of critical care outreach services before and after critical care: a matched-cohort analysis. *J Crit Care* 2010;25:196-204.
14. The fifth report from the Patient Safety Observatory. Safer care for the acutely ill patient: learning from serious incidents. NPSA 2007

Method and data returns

Expert group

A multidisciplinary group of experts comprising consultants from emergency medicine, intensive care, anaesthesia, cardiology, nursing, resuscitation officers, representatives from the Resuscitation Council (UK), a lay representative and a scientific advisor contributed to the design of the study.

Aim

To describe variability and identify remediable factors in the process of care of adult patients who receive resuscitation in hospital, including factors which may affect the decision to initiate the resuscitation attempt, the outcome and the quality of care following the resuscitation attempt, and antecedents in the preceding 48 hours that may have offered opportunities for intervention to prevent cardiac arrest.

Objectives

Based on the issues raised by the expert group, the objectives of this study were to collect information on the following:

1. The organisational structures and governance in place to provide resuscitation, including training and the uptake of training by members of staff.
2. The structures in place to identify patients at risk of a cardiac arrest, and so identify opportunities to intervene.
3. Outcome following resuscitation.
4. DNAR/DNACPR status of patients who have had a cardiac arrest and describe the appropriateness of resuscitation with regard to each patient who received CPR.
5. The process of the resuscitation attempt, and so differentiate between the organisational structures in place to provide resuscitation, and what actually happens.
6. The quality of care in the 48 hours prior to cardiac arrest.
7. The quality of care in the post-resuscitation period.

Population

All adult patients who had a cardiac arrest, triggering either a call to the resuscitation team (or equivalent) via 2222 (or the completion of an audit form subsequent to the resuscitation attempt) that led to the delivery of chest compressions or defibrillation during the 14 day study period: 1st-14th November 2010 inclusive.

Hospital participation

National Health Service hospitals in England, Wales and Northern Ireland were expected to participate, as well as hospitals in the independent sector and public hospitals in the Isle of Man, Guernsey and Jersey. Hospitals that treated only children were not required to participate in the study.

Within each hospital, a named contact, referred to as the NCEPOD Local Reporter, acted as a link between NCEPOD and the hospital staff, facilitating case identification, dissemination of questionnaires and data collation.

Exclusions

- All patients in intensive care were excluded because intensive care units are equipped to deal with cardiac arrests without the need for a resuscitation team, and from a practical point of case identification, they do not generally use 2222 calls.
- Patients who arrested before reaching the emergency department were excluded as all pre-arrest data would have been unobtainable in the scope of this study.
- Children under the age of 16.

Case Identification and Data Collection

Prospective data collection

Data collection took place in two stages. Firstly, data were collected prospectively at the time of the resuscitation attempt via the completion of a short 'resuscitation form' completed by the resuscitation team leader (or most appropriate person involved in the resuscitation attempt). This allowed prompt identification of patients having a cardiac arrest and resuscitation attempt during the data collection period. This ensured that data were collected accurately with regard to the composition of the resuscitation team and details of events that occurred at the time of the resuscitation attempt. Often this information is not clear from the case notes and are difficult to obtain retrospectively.

Retrospective case identification

NCEPOD Local Reporters retrospectively identified all patients who had a resuscitation attempt in the data collection period via the hospital 2222 log and/or local patient administration system. They completed a spreadsheet supplied by NCEPOD, with information about each case including the details of the consultant at the time of the resuscitation attempt. These cases were then matched to the completed resuscitation forms by NHS number, hospital number and date of birth.

Questionnaires

Four questionnaires were used to acquire data for this study:

- The resuscitation form, completed prospectively as described.
- A clinical questionnaire completed by the clinician responsible for the patient at the time of the arrest. Questionnaires were limited to three per clinician.
- An assessment form completed by the Advisors reviewing the case notes, clinical questionnaire and resuscitation form.
- An organisational questionnaire that was sent to each hospital (possibly more than one in a Trust) that had a dedicated on-site resuscitation team. This questionnaire was used to obtain information on the facilities and resources available for the management of patients who received a resuscitation attempt. Hospitals that did not have a dedicated on-site resuscitation team were not required to complete a full questionnaire but were asked to describe what procedures were in place in the event that a patient had a cardiac arrest.

Case notes

For each included patient, case note extracts were requested for the following time-frames to enable peer review: the first 24 hours of admission, 48 hours prior to cardiac arrest (if not included in the above), 48 hours following cardiac arrest (if the patient survived) and discharge documentation (if not included in the above). The following documents were requested:

- In-patient and out-patient annotations
- Nursing notes
- Observation charts
- Fluid balance charts
- Haematology and biochemistry results
- ECG results
- DNACPR documentation
- Incident report form and details of outcome
- Internal audit form for cardiac arrest
- Discharge summary

Advisor group

A multidisciplinary group of Advisors was recruited to review the case notes and associated questionnaires. The group of Advisors comprised clinicians from the following specialties: emergency medicine, anaesthesia, critical care, cardiology/general medicine, and resuscitation officers.

All questionnaires and case notes were anonymised by the non-clinical staff at NCEPOD. All patient, clinician and hospital identifiers were removed. Neither Clinical Co-ordinators at NCEPOD, nor the Advisors had access to such identifiers.

After being anonymised each case was reviewed by one Advisor within a multidisciplinary group. At regular intervals throughout the meeting, the chair allowed a period of discussion for each Advisor to summarise their cases and ask for opinions from other specialties or raise aspects of a case for discussion.

The grading system below was used by the Advisors to grade the overall care each patient received.

Good practice – a standard that you would accept for yourself, your trainees and your institution

Room for improvement – aspects of **clinical** care that could have been better

Room for improvement – aspects of **organisational** care that could have been better

Room for improvement – aspects of both **clinical and organisational** care that could have been better

Less than satisfactory – several aspects of **clinical and/or organisational** care that were well below satisfactory

Insufficient information submitted to assess the quality of care

Quality and confidentiality

Each case was given a unique NCEPOD number so that cases could not easily be linked to a hospital.

The data from all questionnaires received were electronically scanned into a preset database. Prior to any analysis taking place, the data were cleaned to ensure that there were no duplicate records and that erroneous data had not been entered during scanning. Any fields in an individual record that contained spurious data that could not be validated were removed.

Data analysis

The qualitative data collected from the Advisors' opinions and free text answers in the clinician questionnaires were coded, where applicable, according to content to allow quantitative analysis. The data were reviewed by NCEPOD Clinical Co-ordinators and Clinical Researchers to identify the nature and frequency of recurring themes. Case studies have also been used throughout the report to illustrate particular themes.

All data were analysed using Microsoft Access and Excel by the research staff at NCEPOD.

The findings of the report were reviewed by the Expert Group, Advisors and the NCEPOD Steering Group prior to publication.

Study sample denominator data by chapter

Within this report the denominator used in the analysis may change for each chapter and occasionally within each chapter. This is because data have been taken from different sources depending on the analysis required. For example in some cases the data presented will be a total from a question taken from the clinician questionnaire only, whereas some analyses may have required data from the clinician questionnaire and the Advisors' view taken from the case notes.

In total 526 sets of case notes were assessed by the Advisors. The remainder of the returned case note extracts (54 sets) were too incomplete for assessment. The number of clinician questionnaires included in the study analysis is 585, the number of resuscitation forms included is 787 and organisational data were collected from 460 hospitals, with 383 of these sites having a

dedicated resuscitation team on-site and completing the full questionnaire. A further 200 hospitals returned data on what happens in the event of a cardiac arrest.

Data returns

Figure 1.1 shows the case returns for the study.

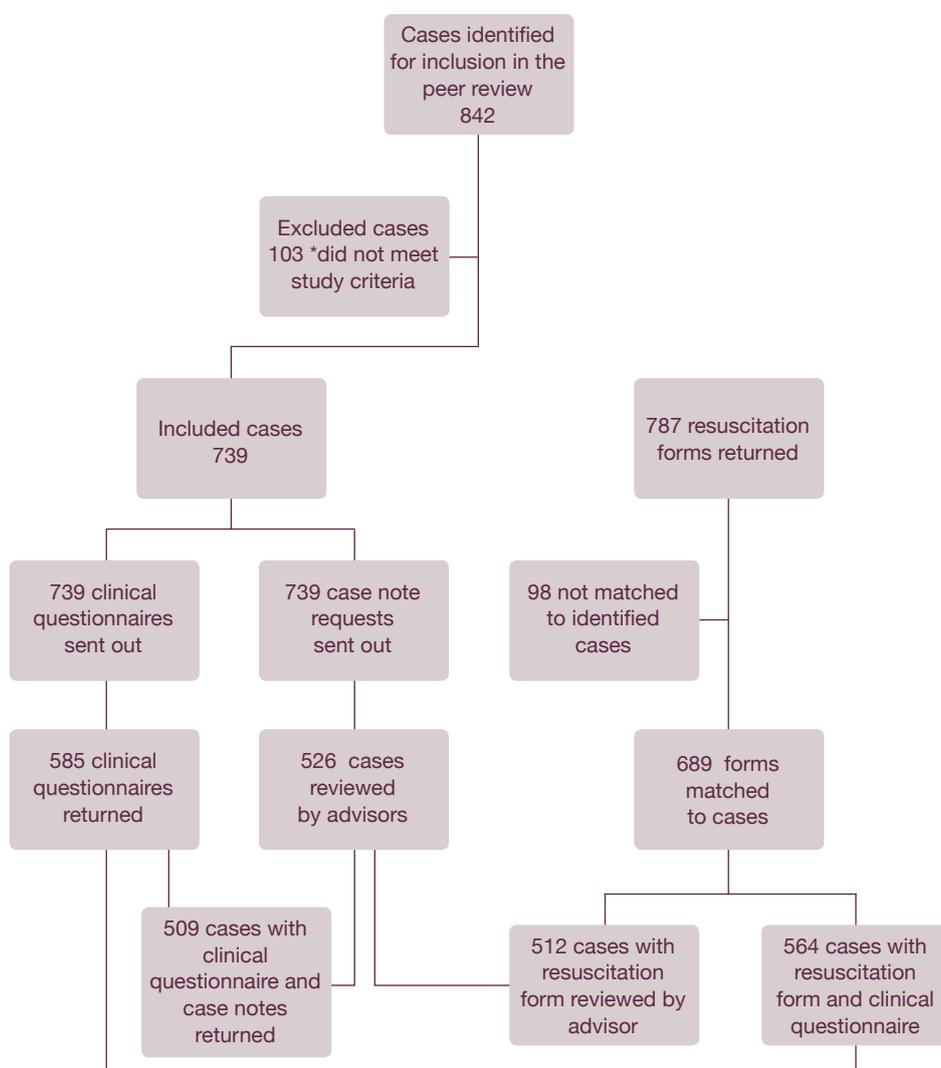


Figure 1.1 Data returned

The Advisors considered the overall care of patients and graded it as shown in Figure 8.1.

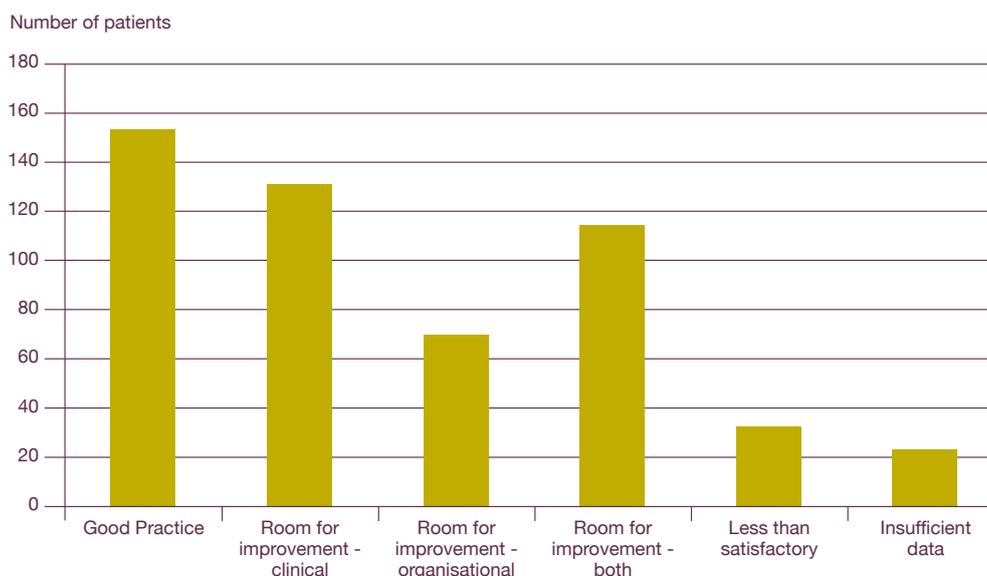


Figure 8.1 Overall quality of care - Advisors' opinion

The care of patients was considered to be good in only 29% (154) of patients assessed in this study. There was room for improvement in the clinical care of 132 (25%) of patients, room for improvement in the organisational care of 70 (13%) of patients and room for improvement in both in 115 (22%) of patients. Overall the Advisor's believed that care was less than satisfactory in 33 (6%) patients.

Clinicians returning the clinical questionnaire were asked if there were any factors that, if changed, could have affected the outcome positively. Table 8.2 shows that there were 71 positive responses to this question and categories the responses.

Table 8.2 Action that may have improved outcome if something had been done differently - Clinician caring for the patients' opinion

Action	n
Earlier treatment of problem	14
DNACPR decision	13
Better monitoring	12
Escalation to higher level of care	5
Early warning score acted on	4
Correction of wrong diagnosis made	3
Escalation to consultant	2
Administration of treatment as stated by the consultant	1
Correction of wrong treatment	1
Other	16
Total	71

Summary

In summary, the care of patients who had an in-hospital cardiac arrest was less than good in seven out of 10 cases. Deficiencies were noted in the admission process, consultant involvement, decision making about CPR status, recognition of severity of illness and markers of risk, appreciation of urgency and requirement to escalate to more senior doctors. It appeared that these aspects of care prior cardiac arrest provide the biggest opportunities to improve patient outcome. The report also highlights areas for improvement in both the resuscitation attempt and post cardiac arrest care. However it must be emphasised that the outcome for patients once they have had a cardiac arrest is very poor and the focus must be on prevention in the first instance.

The data from this study seems to give an overall picture of unreliability in the recognition of the deteriorating patient; failure to respond to deterioration reliably and failure to engage senior doctors to direct intervention either to prevent further deterioration or facilitate DNACPR decisions. This report therefore raises two main challenges to all health care professionals:

1. To ensure rapid and consistent recognition and management of acute illness in order to maximise patients' chance of recovery.
2. To ensure that decision making about CPR is applied consistently, communicated effectively and that CPR is performed only on patients who are likely to benefit from it.

Key findings and recommendations

Key Findings - Patient population, initial assessment and first consultant review

An adequate history was not recorded in 70/489 cases (14%) and clinical examination was incomplete at first contact in 117/479 cases (24%).

Appreciation of the severity of the situation was lacking in 74/416 (18%).

Timely escalation to more senior doctors was lacking in 61/347 (18%).

Initial assessment (up to first consultant review or first 24 hours if consultant review could not be identified) was considered to be deficient in 230/483 (48%) cases.

Deficiencies were present in many domains but by far the greatest number of concerns was raised about decisions regarding CPR status (107 cases).

Decisions about CPR status were documented in the admission notes in 44/435 cases (10%). This is despite the high incidence of chronic disease and almost one in four cases being expected to be rapidly fatal on admission.

Advisors were of the opinion that a further 89 patients should have had a DNACPR decision made in this initial phase of their treatment.

In the opinion of the Advisors 37/392 patients admitted to Level 1 care should have received Level 2 or 3 care (9%).

First consultant review could be identified only in 277/521 cases (53%) and time to first consultant review could be determined only in 198/521 cases (38%).

Where time to first consultant review could be identified it was more than 12 hours in 95/198 cases (48%).

Consultant review was considered inappropriately late in 45/257 cases (18%).

CPR status was considered in only 31/234 cases at first consultant review (13%).

Recommendations - Patient population, initial assessment and first consultant review

Standards of clerking/examination and recording thereof should be improved. Each hospital should ensure that the detail required in clerking and examination is explicit and communicated to doctors-in-training as part of the induction process. A regular (6-monthly) audit of performance against these agreed standards should be performed and reported through the governance structure of the organisation. *(Medical Directors and all Doctors)*

Hospitals must ensure appropriate supervision for doctors-in-training. Delays in escalation to more senior doctors due to lack of recognition of severity of illness by doctors in training are unacceptable and place patients at risk. *(Medical Directors)*

Each Trust/hospital must provide sufficient critical care capacity or pathways of care to meet the needs of its population. *(Chief Executives)*

Each entry in a patient's case notes must contain date, time, location of patient and name and grade of staff and their contact details. It must also contain information on the most senior team member present during that patient contact (name and grade). *(All health Care Professionals)* As previously recommended by NCEPOD and the RCP, all acute admissions must be reviewed at consultant level within 12 hours of admission. Earlier consultant review may be required and arrangements should be in place to ensure that this is available. A regular (6-monthly) audit of performance against this standard should be performed and reported through the governance structure of the organisation. *(Medical Directors and Consultants)*

Continued over

CPR status must be considered and recorded for all acute admissions, ideally during the initial admission process and definitely at the initial consultant review when an explicit decision should be made, and clearly documented (for

CPR or DNACPR). When, during the initial admission, CPR is considered as inappropriate, consultant involvement must occur at that time. *(All Doctors)*

Key Findings - Care before the cardiac arrest

Most patients who had an in-hospital cardiac arrest were considered to be on the correct ward at the time (521/565; 92%).

68% of patients (394/583) had been in hospital for longer than 24 hours prior to cardiac arrest.

7/573 patients who underwent CPR were on an end of life care pathway. All seven patients died in hospital.

Appreciation of urgency, supervision of junior doctors and the seeking of advice from senior doctors were rated 'poor' by Advisors.

Physiological instability was noted in 322/444 (73%) of patients who subsequently had a cardiac arrest.

Advisors considered that warning signs for cardiac arrest were present in 344/462 (75%) of cases. These warning signs were recognised poorly, acted on infrequently, and escalated to more senior doctors infrequently.

Many patients had multiple reviews in the 48 hour period prior to cardiac arrest, 160/391 had more than 5 reviews. There was no evidence of escalation to more senior staff in patients who had multiple reviews.

Advisors considered that the cardiac arrest was predictable in 289/454 (64%) and potentially avoidable in 156/413 (38%) of cases.

Recommendations - Care before the cardiac arrest

NICE Clinical Guideline 50 (Acutely Ill patients in hospital: Recognition of and response to acute illness in adults in hospital) is not applied universally. Each hospital must ensure that they comply with this NICE guidance. *(Medical Directors)*

For all patients requiring monitoring, there must be clear instructions as to the type and frequency of observations required. Where 'track and trigger' systems are used the initial frequency of observations should be stated clearly by the admitting doctor. *(All Doctors)*

Where patients continue to deteriorate after non-consultant review there should be escalation of patient care to a more senior doctor. If this is not done, the reasons for non-escalation must be documented clearly in the case notes. *(All Doctors)*

Hospitals should undertake a detailed audit of the period prior to cardiac arrest to examine whether antecedent factors were present that warned of potential cardiac arrest and what the clinical response to those factors was. *(Medical Directors)*

A national standard dataset should be developed to audit antecedent factors against.

Key Findings - Resuscitation status

CPR status was recorded in only 122/552 (22%) of patients. Of these 122 patients, 70 were for CPR and 52 had a DNACPR decision.

52 patients who received CPR had a documented DNACPR decision.

430/522 patients (78%) had no documentation about CPR status.

Reasons stated for patients remaining for CPR included: Patient remained for full and active treatment (326/424; 77%) and lack of time to discuss or document decision (60/424; 14%)

In 196/230 cases where there was sufficient data Advisors felt that a DNACPR decision should have been made.

Key Findings - Resuscitation attempt

More than half of the cardiac arrests in this study occurred on medical/surgical wards (429/781; 55%).

458/776 cardiac arrests (59%) occurred 'out of hours'.

Most cardiac arrests where the cause was known were secondary to non-cardiac disease (356/591; 60%).

The initial rhythm was pulseless electrical activity in 53%, asystole in 227/712 (32%) and VF/VT in 110/712 (15%).

Almost one in five patients in whom defibrillation was indicated did not receive a shock within 3 minutes of recognition of cardiac arrest.

In only 486/634 cases (77%) an anaesthetist or intensivist was part of the resuscitation team.

There were 234 problems identified by the treating clinicians during the 787 resuscitation attempts. The most common problems were equipment (7%), airway management (6%) and team work (4%).

The Advisors reported problems during the resuscitation attempt in 91/526 cases (17%). Of these, 36/91 were associated with airway management.

Recommendations - Resuscitation status

An effective system for recording all decisions and discussions relating to CPR/DNACPR must be established, allowing all people who may care for the patient to be aware of this information. *(Medical Directors)*

Health care professionals as a whole must understand that patients can remain for active treatment but that in the event of a cardiac arrest CPR attempts may be futile. Providing active treatment is not a reason not to consider and document what should happen in the event of a cardiac arrest. *(All Health Care Professionals)*

The use of 'ceilings of care' documentation would facilitate decision making and clarity of intent. There is need for a national project to lead this work.

Recommendations - Resuscitation attempt

Hospitals must arrange services and equipment to ensure that defibrillation is delivered within three minutes of cardiac arrest (for shockable rhythms). *(Medical Directors)*

All CPR attempts should be reported through the Trust/Hospital critical incident reporting system. This information should be reported to the Trust/Hospital Board on a regular basis. *(Medical Directors)*

Each Trust/Hospital should set a local goal for reduction in cardiac arrests leading to CPR attempts. Progress against this goal should be reported to the Trust/Hospital Board on a regular basis. *(Medical Directors)*

Each hospital should ensure there is an agreed plan for airway management during cardiac arrest. This may involve bag and mask ventilation for cardiac arrests of short duration, tracheal intubation if this is within the competence of members of the team responding to the cardiac arrest or greater use of supraglottic airway devices as an alternative. *(Medical Directors)*

Key Findings - Period after the cardiac arrest

Survival to discharge after in-hospital cardiac arrest was 14.6% (85/581).

Only 9/165 (5.5%) patients who had an arrest in asystole survived to hospital discharge.

Survival to hospital discharge decreased as length of hospital stay prior to cardiac arrest increased. Only 14/554 (9.1%) of patients who had a cardiac arrest after an inpatient stay of >7 days survived to hospital discharge.

Survival to discharge after a cardiac arrest at night was much lower than after a cardiac arrest during the day time (13/176; 7.4% v 44/218; 20.1%).

In the post arrest period 84/191 (44.0%) patients had a DNACPR decision made.

Location of post arrest care was judged to be appropriate in 95% of cases.

Many patients were expected to die post cardiac arrest and were not admitted to critical care (66/113).

It was considered that in 100 patients who had return of circulation, the cause of the cardiac arrest primary myocardial. Only 30 of these 100 patients had coronary angiography, and PCI where appropriate, in the post cardiac arrest phase.

Organ support in critical care was judged to be appropriate in most cases. (105/110; 96%).

Life sustaining therapies were withdrawn in 38 cases. Organ donation was considered in six of those cases.

Recommendations - Period after the cardiac arrest

Each hospital should audit all CPR attempts and assess what proportion of patients should have had a DNACPR decision in place prior to the arrest and should not have undergone CPR, rather than have the decision made after the first arrest. This will improve patient care by avoiding undignified and potentially harmful CPR attempts during the dying process. *(Medical Directors)*

Consultant input is required in the immediate post arrest period to ensure that decision making is appropriate and that the correct interventions are undertaken. *(Consultants)*

Coronary angiography and PCI should be considered in all cardiac arrest survivors where the cause of cardiac arrest is likely to be primary myocardial ischaemia. *(Consultants)*

Organ donation should be considered in every case where life sustaining therapies are being withdrawn. *(Consultants)*

