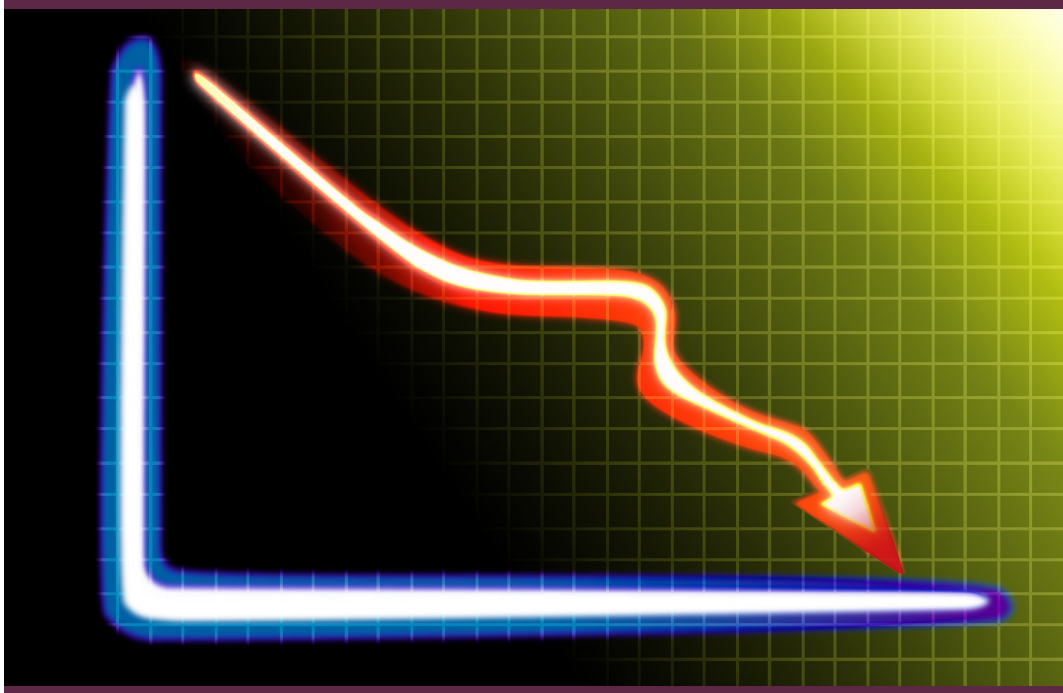
Time to Intervene?

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



NCEPOD

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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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Foreword

This may be the most important report that NCEPOD has produced in the last 10 years. I say this because it reveals the need for a closer definition of the aims of treatment of sick people in our hospitals.

Our study reflects a belief that there is disparity between the public and professional perception of the outcome of cardiopulmonary resuscitation (CPR). Television melodrama and the lay press convey a much more optimistic view of the whole process than professionals believe to be realistic. The public believe that patients have a 50:50 chance of surviving, where the professionals accept that survival to discharge is less than 15%†. Nor does public appreciation factor in the chance that survival will often involve disability.

Professionals may know otherwise, but they rarely find the opportunity to articulate their knowledge and when they do, they frequently do not take sufficient account of the morbidity involved in their assessment of the prospects of success. In short, too many of us have drifted into an expectation that death will provoke a physical intervention as part of a last ditch attempt to prolong life. As a result the professions fail to give an appropriate priority to their obligation to define the objects of the exercise, "the ceilings of treatment." It is trite theory to say that these should be decided by doctors and patients together where practical, and by doctors accepting their responsibility to take decisions in their patients' best interests where it is not. In practice it seems that no decision at all is taken in the overwhelming majority of cases, and CPR is too commonly an instinctive response to an unforeseen emergency.

There are a number of reasons for hoping that this Report will prompt us all to step back and think again. Some of the findings are surprising, others reflect a failure to think more carefully about things that are hardly counter-intuitive. For example, this study found that the survival rate of 10-15% is a very broad brush figure that cannot be applied to individual cases without further inquiry. Cases that respond to defibrillation after being diagnosed immediately are more likely to recover than people who arrest as a result of some other condition, some days after being admitted to hospital or at a time when they are not being closely monitored. No-one should be surprised to find that the latter group's chance of surviving to discharge is less than half of those who arrest in the Emergency Department (ED) or the Operating Theatre.

A moment's thought will also tell us that survival to discharge after such an experience does not necessarily entail returning to live in one's own home with the same degree of autonomy as before. This study does not follow up the quality of survival beyond noting the number who returned to their own home, which was greatly reduced. However it seems that if you have a cardiac arrest late at night, a week or so after you were admitted to hospital with a non-cardiac disease, your chance of ever getting back to your own home must be vanishingly small.

If this study forces people to confront in a practical way the limits of what is possible against that background, it will have done us a service, but the true lessons go much further.

It is well established that surgeons who operate without the informed consent of their patients are guilty of an assault and will be held to have acted unethically in the eyes of the General Medical Council. There is no basis for asserting that different considerations apply to CPR: certainly there are emergency circumstances in which

† *Roberts D Hirschman D Scheltemak Adult & Pediatric CPR: Attitudes and Expectations of Health Professionals and Lay Persons, An J Emerge Med 2000; 18: 465/8*

a doctor is entitled to assume that the patient would wish an attempt at CPR to be made. But that cannot defend the failure over a period of several days to find out what the patient's wishes may be, or where this is not possible, to determine the team's view of the patients' best interests. The surgeon will rightly operate when we arrive in the ED unconconscious after a road traffic cash, but no-one supposes that as a result this entitles them to operate without our consent on another occasion.

It was in the hope of finding out how far that ethical obligation sounds in modern medical practice that I approached this report. Alas, the results are profoundly disappointing and as I read these pages I wondered how many of these interventions would be defensible if charged as assaults before the criminal courts, or as professional misconduct before the GMC. The GMC recognises that CPR should be administered in an emergency, but it is not good medical practice to fail to anticipate the needs of the patient before an emergency arises. If the failure is deliberate or reckless then I suggest that it is arguably criminal.

Our advisors did find that in a substantial number of cases resuscitation was attempted when they thought a DNACPR (Do Not Attempt CPR) decision should have been made earlier. The first reason is that in too many cases the failure to formulate an appropriate plan reflects the fact that the assessment on admission was judged to be deficient overall in 47% of these patients (Table 3.23). This is the reality of modern medicine as revealed by other NCEPOD reports. Despite repeated calls for all acute admissions to be seen by a Consultant within 12 hours,‡ our Advisors could only identify an appropriate timely Consultant review in 40% of cases. The days when the assessment of acute admissions could be left to juniors have gone, because the juniors are less experienced, the patients are often more ill and the expectations of society are less tolerant.

Even once that proposition is accepted, it is still thoroughly dispiriting to find that in 38% of cases the cardiac arrest could have been prevented altogether. If the patient had been managed as they should have been, our Advisors thought that the arrest would not have happened in the majority of cases. This is bad medicine involving the avoidable death of patients with consequent lessons for the professions.

A decision about whether resuscitation should or should not be attempted was documented on admission in only 10% of cases. Our Advisors thought DNACPR should have been documented in a further 20%. In short, resuscitation was wrongly attempted in many of these cases because nobody had recognised that they were in danger of a cardiac arrest.

When we looked at the decision tree the picture was even worse. Of the 22% of patients whose resuscitation status had been determined before their arrest, 42% had a DNACPR decision. This finding caused particular dismay to our advisors and authors, but it is hardly surprising. The fact that no decision has been taken may have fed an expectation it need not be considered in the emergency.

In the overwhelming majority of cases the question of CPR was not raised with the patient before the arrest, which suggests that this may be cultural rather than the product of a deliberate decision in each case. Some case reports said this happened because there was no opportunity, a proposition our advisors struggled to reconcile with some of the intervals that elapsed between admission and the arrest.

This report suggests that today we stand at a crossroads. To the left lies a destiny familiar from America where 60% of us will die in an ICU and we will spend 50% of NHS expenditure in the last six months of life, much of it seeking to postpone the inevitable. This will happen, not because the patient has asked for it or because someone has taken a calculated decision that it is in the patient's interest to make the attempt, but because the doctors think that they have a duty to do everything that they can to prolong the process of dying.

‡ *NCEPOD Studies: 'A Journey in the Right Direction?' 2007, 'Adding Insult to Injury' 2009 and the Royal College of Physicians 'Acute Care Toolkit 2'.*

To the right lies an acceptance of the limits of what is practical and a recognition that the armamentarium of medicine should be deployed only where it is likely to benefit the patient. In an age of unprecedented respect for the patient's autonomy, wherever possible a contract should be formed. This means that we should be given the opportunity of deciding what is to be done in the event of a cardiac arrest after admission to hospital. If we are unable to take part in such a discussion a decision should be taken by others as to whether it is in our best interests.

As a lawyer, when I accept a client I have a professional duty to agree with them in writing what the objectives are, what the scope of my authority is to be and what the risks and benefits may be. Our increasing respect for the autonomy of the patient ought to lead the medical profession to embrace a similar course. The right to consent to treatment is not confined to surgery. The "ceilings of treatment" should be described and agreed whenever possible. The patient's views on resuscitation should be canvassed wherever possible and appropriate. Where it is not possible and the doctors have to act in what they perceive to be the patient's best interests, that should not be interpreted as an obligation to administer CPR to the dying. The doctor's right to act in this context is coterminous with his duty: a patient may only be resuscitated where they have consented to the process or the doctor is satisfied that it is in their best interests.

This report should be a wake-up call to the NHS. It is over a century since Osler urged trainees to "listen to the patient, he is telling you the diagnosis." Today we must add that if you have the humility to ask, they will often tell you what they want you to do about it as well.

One final thought. The negative connotations of Do Not Attempt CPR orders may be associated with a concern that other aspects of care will be compromised. It has been suggested that what people are really trying say is that when the inevitable occurs they should Allow Natural Death "AND," or Allow Dignified Death "ADD".

Mr Bertie Leigh, Chair of NCEPOD

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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)*

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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 al[1], 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 colleagues[4] and has been subsequently demonstrated in other publications.[5-8] Following work by NCEPOD[2] 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.

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1 – 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.

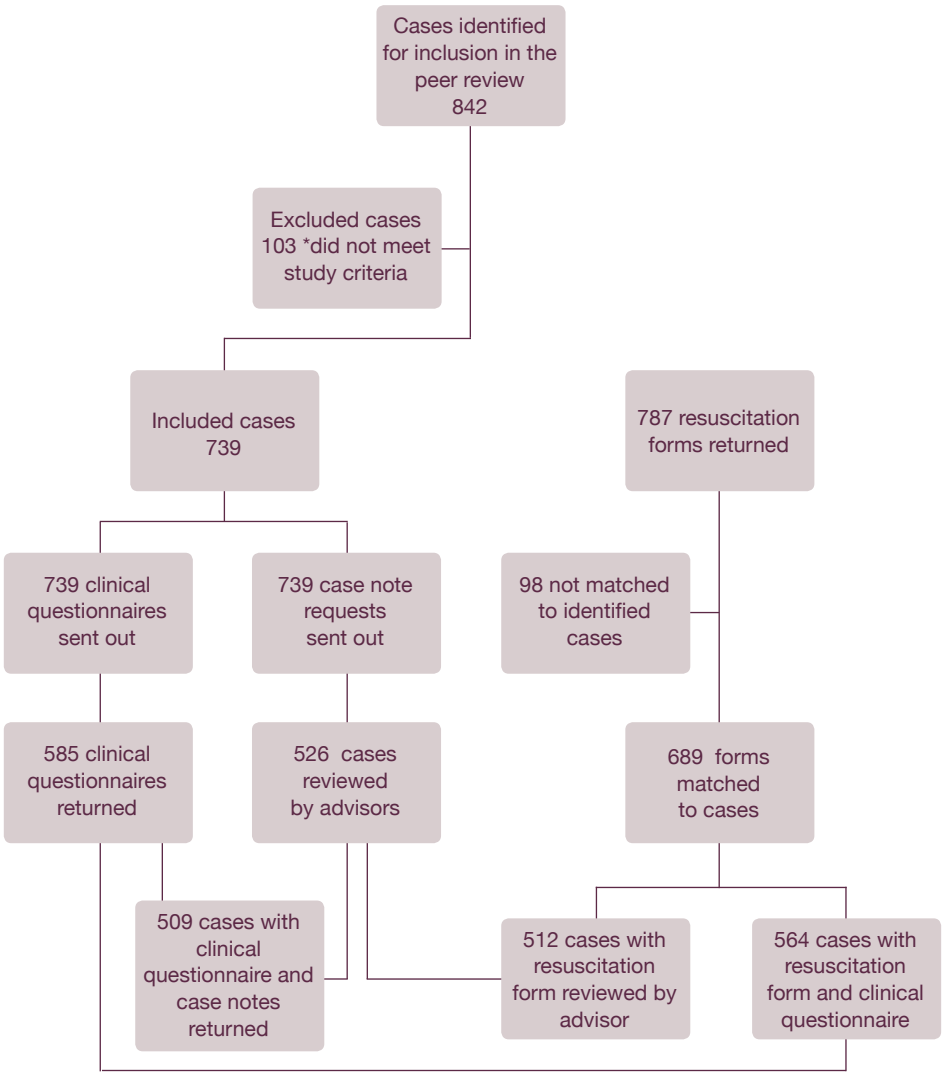

Figure 1.1 Data returned

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2 – Organisational data

This chapter aims to provide an overview of the availability of certain key facilities, policies and clinical pathways that would be relevant to the care of patients who have an in-hospital cardiac arrest. Organisational data were collected from participating hospitals that had an on-site resuscitation team. Those without a resuscitation team on-site were asked to provide information on what happens in the event of a patient suffering a cardiac arrest.

Table 2.1 gives details of the hospitals that participated. The 'other' group included community hospitals (159), rehabilitation centres (11) and peripheral site of trust (8).

Table 2.1 Participating hospital types

Hospital type	n
District general hospital <500 beds	113
District general hospital >500 beds	57
University teaching hospital	62
Private hospital	132
Tertiary specialist unit	44
Other type of hospital	185
Total	**593**

Table 2.2 shows the type of hospital by whether or not it had a designated resuscitation team for adult patients on-site (hospitals with an on-site resuscitation team completed the whole organisational questionnaire). Those without a resuscitation team tended to be private hospitals and 'other' were identified as treatment centres, specialist hospitals and small community hospitals and other facilities where it would be difficult to provide on-site resuscitation teams (192/200).

Table 2.3 Response to a cardiac arrest where there was no on-site resuscitation team

Response to a cardiac arrest	n	%
Basic life support and 999 call	160	82.1
Summon cardiac arrest team from another site	13	6.7
Other (e.g. bleep holder)	22	11.2
Subtotal	**195**	
Not answered	5	
Total	**200**	

Table 2.3 shows what action hospitals without an on-site resuscitation team took in the event of a cardiac arrest. In most hospitals without a resuscitation team the action was to initiate basic life support and summon assistance via the ambulance service.

Table 2.2 Hospital type and whether they had an on-site resuscitation team

	Hospital had a dedicated on-site resuscitation team			
Hospital type	**Yes**	**No**	**Not answered**	**Total**
District general hospital <500 beds	109	4	0	**113**
District general hospital >500 beds	55	2	0	**57**
University teaching hospital	60	2	0	**62**
Private hospital	117	14	1	**132**
Tertiary specialist unit	26	15	3	**44**
Other	16	163	6	**185**
Total	**383**	**200**	**10**	**593**

Most hospitals with a resuscitation team had only one such team (323/369 – 88.5%). However, the remainder had multiple teams and 11 hospitals reported that they had four or more teams. It may well be that where multiple teams exist, the teams had extended roles and functions as it is unlikely that there are sufficient cardiac arrests to account for this number.

Table 2.4 Type of outreach teams available

Outreach teams	n	%
Critical care outreach	195	87.1
Medical emergency team	52	23.2
Rapid response team	22	9.8

Answers may be multiple (n/224; not answered in 159)

In addition to designated teams to respond to cardiac arrests, hospitals were asked if they had any of the outreach teams detailed in Table 2.4. Of the hospitals from which a response was received 224 indicated that they had an outreach team of some sort and some hospitals indicated that they had more than one type. There is possibly some overlap in the descriptors used in Table 2.4. However 159 hospitals (44.1%) did not indicate that they had any form of outreach team. This is a key element of a systematic response to acute illness and raises the possibility that practice is not in keeping with NICE guidance on this topic.[9]

Table 2.5 shows the number of 2222 calls (or equivalent) to the resuscitation team between 1/1/09 and 31/12/09. Ninety-four hospitals had 100 or less calls in that 12 month period, 137 hospitals had between 100 – 500 calls and 16 hospitals had more than 500 calls. It must be remembered that many hospitals will use the same number (2222) to summon urgent help for patients who may not have had a cardiac arrest but are considered acutely unwell, and for other reasons, for example security breaches. Therefore not all these calls may represent cardiac arrests, this is demonstrated in Figure 2.1 which highlights the percentage of calls that were actual arrests. In hospitals where the number of calls is very low, opportunities for training will be reduced, and ensuring that skills and knowledge are retained is an important consideration. It was notable that 136 hospitals did not answer this question – raising the possibility that data on cardiac arrests were not collected.

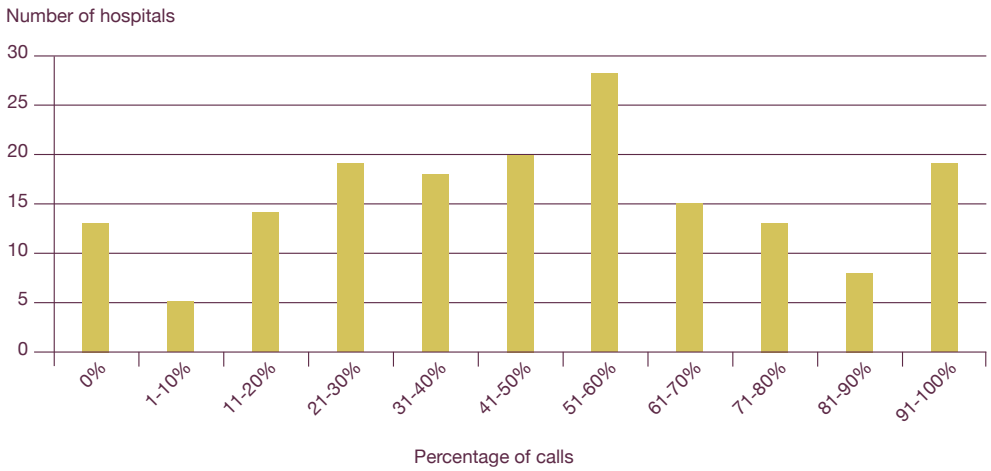

Figure 2.1 Percentage of 2222 calls reported between 1/1/09-31/12/09 that represented resuscitation attempts *(n= 172, No 2222 calls or CPR attempts recorded in 22 hospitals, data missing in 189 hospitals)*

Table 2.5 Number of 2222 calls to the resuscitation team between 1/1/09 and 31/12/09

Number of 2222 calls	n	%
0	22	8.9
1-10	32	13.0
11-20	15	6.1
21-50	17	6.9
51-100	8	3.2
101-200	35	14.2
201-300	48	19.4
301-400	32	13.0
401-500	22	8.9
501-1000	13	5.3
>1000	3	1.2
Subtotal	**247**	
Not answered	136	
Total	**383**	

Table 2.6 Number of actual CPR attempts between 1/1/09 and 31/12/09

Number of CPR attempts during a year	n	%
0	53	22.9
1-10	49	21.2
11-20	7	3.0
21-50	10	4.3
51-100	27	11.7
101-200	58	25.1
201-300	19	8.2
301-400	7	3.0
401-500	1	<1
Subtotal	**231**	
Not answered	152	
Total	**383**	

Table 2.6 shows the number of CPR attempts that took place during the same twelve month time period. Again there was a high number of hospitals (152) who did not respond to this question. This does not give confidence that there is uniform collection of robust data about CPR. The percentage of 2222 calls attended by a resuscitation officer is shown in Figure 2.2.

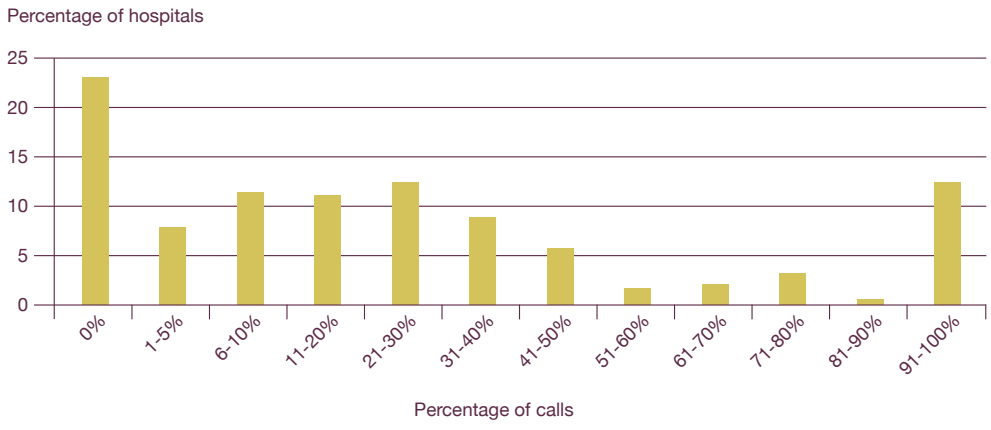

Figure 2.2 Percentage of 2222 calls attended by resuscitation officers
(n=261, not answered in 122 hospitals)

Of the hospitals from which a response to this question was received, 60/261 stated that a resuscitation officer never attended any cardiac arrest calls (23%) and a further 79/261 hospitals responded that resuscitation officers attended less than 20% of cardiac arrest calls (30%). It is hard to interpret these figures as the role of resuscitation officers has evolved quite rapidly in some hospitals. Resuscitation officers now have a crucial role in training, risk management, data collection and audit, but their value in demonstrating clinical skills and leadership during actual cardiac arrests should not be neglected.

Table 2.7 Estimated or actual number of calls attended by a resuscitation officer

Estimate/actual	n	%
Estimate	153	59.3
The actual number	105	40.7
Subtotal	**258**	
Not answered	3	
Total	**261**	

Where hospitals provided details on the percentage of calls attended by a resuscitation officer it was asked if this was an estimated or actual number. Table 2.7 shows that it was an actual number in 40% of hospitals, an estimate in 60% and unanswered in 125 hospitals. Again this does not give assurance that data on cardiac arrests are collected well in all hospitals.

Training in management of a cardiac arrest is important and hospitals should ensure that their staff are trained appropriately to undertake this task. Table 2.8 shows if the hospital had any record of the resuscitation competencies of the resuscitation team.

Overall 93/367 hospitals did not record the resuscitation competencies of their staff (25%). There was some variation by type of hospital and private hospitals had the highest recording rate of competency of staff (103/113: 91%). It is difficult to understand how hospitals are confident that staff have the appropriate skills if there was no record of competencies in one in four hospitals.

Table 2.8 Hospital had a record of the resuscitation competencies of their staff

Hospital type	Yes	No	Unknown	Subtotal	Not answered	Total
District general hospital <500 beds	60	36	6	**102**	7	**109**
District general hospital >500 beds	33	15	5	**53**	2	**55**
University teaching hospital	33	24	0	**57**	3	**60**
Private hospital	103	6	4	**113**	4	**117**
Tertiary specialist unit	18	7	1	**26**	0	**26**
Other	10	5	1	**16**	0	**16**
Total	**257**	**93**	**17**	**367**	**16**	**383**

Table 2.9 shows the response to the question 'what number do you call to summon the resuscitation team?' by type of hospital.

Table 2.9 Resuscitation team call number by type of hospital

Hospital type	2222	Other	Subtotal	Not answered	Total
District general hospital <500 beds	103	6	**109**	0	**109**
District general hospital >500 beds	52	2	**54**	1	**55**
University teaching hospital	58	2	**60**	0	**60**
Private hospital	66	39	**105**	12	**117**
Tertiary specialist unit	25	1	**26**	0	**26**
Other	13	2	**15**	1	**16**
Total	**317**	**52**	**369**	**14**	**383**

Of the hospital that responded 317/369 (86%) used 2222 as the standard number for summoning the cardiac arrest team. Of the 52 hospitals that did not use 2222, 39 were private hospitals (75%). Where 2222 was not used 21 hospitals used a bleep or cardiac arrest alarm and 24 used an alternative telephone number (6666 was the most commonly used: 12 hospitals). It is recommended that 2222 should be the standard number used to summon a cardiac arrest team[15] and in 14% of hospitals this had not been implemented. Whilst standardisation of the number used to summon the cardiac arrest team is sensible it must be remembered that once the patient has had a cardiac arrest the outlook is poor and most opportunities to improve outcome are in the pre-cardiac arrest phase.[16]

Equipment

Table 2.10 Type of defibrillators used

Defibrillator type	n	%
Automated external defibrillators exclusively	34	9.0
Shock advisory defibrillators exclusively	28	7.4
Manual defibrillators exclusively	3	<1
A combination of the above	316	82.8
Subtotal	**381**	
Not answered	2	
Total	**383**	

Table 2.10 shows that the majority of hospitals used a combination of defibrillators. This almost certainly reflects the fact that different types of defibrillator are more suited to clinical and non-clinical areas or areas with a low incidence of cardiac arrest. There is also the potential for some overlap in the definitions used in Table 2.10 as some defibrillators are manual only and some have a shock advisory option. However it is important that staff are trained in the use of these different devices and are familiar with the range of equipment they may encounter.

Table 2.11 Source of defibrillator

Source	n	%
From one standard manufacturer	334	88.8
From multiple manufacturers	42	11.2
Subtotal	**376**	
Not answered	7	
Total	**383**	

The presence of equipment from multiple manufacturers is a potential source of confusion. Table 2.11 shows that in 89% of hospitals defibrillators were obtained from one manufacturer, thus minimising this potential risk of confusion. Irrespective of type or manufacturer, all hospitals replied that a defibrillator was available within three minutes of all clinical areas.

Table 2.12 Hospital had a policy that there was at least one trained member of staff able to perform basic life support and use AED and/or manual defibrillators on each ward

Hospital type	Yes	No	Unknown	Subtotal	Not answered	Total
District general hospital <500 beds	76	27	1	**104**	5	**109**
District general hospital >500 beds	39	12	2	**53**	2	**55**
University teaching hospital	44	14	1	**59**	1	**60**
Private hospital	114	2	0	**116**	1	**117**
Tertiary specialist unit	21	3	2	**26**	0	**26**
Other	14	1	1	**16**	0	**16**
Total	**308**	**59**	**7**	**374**	**9**	**383**

The specific question asked was 'Is it policy that 24 hours/day, 7days/week, there is at least one trained member of staff able to perform basic life support and use an AED and/or manual defibrillators on each ward?' As can be seen 308/374 hospitals (82%) confirmed that this was the case. Private hospitals more commonly answered 'yes' than NHS hospitals – 57/59 cases where this was not policy were NHS hospitals.

All hospitals that responded stated that there was standardised provision of drugs specifically for use in the event of a cardiac arrest. And all hospitals apart from three stated that they had a policy for standardised emergency equipment (trolley) contents for use in emergency situations.

Table 2.13 Frequency that emergency trolleys were checked

Frequency	n	%
After every resuscitation attempt	190	50.0
Every shift	46	12.1
Every 24 hours	313	82.4
Once a week	21	5.5
Less frequently	10	2.6

Answers may be multiple (n/380; not answered in 3)

Table 2.13 shows that only 190 hospitals checked the emergency trolley after every resuscitation attempt. Equipment problems, with regard to both function and availability, are frequently reported incidents during resuscitation[14] and if trolleys are not checked and restocked after every use then these are more likely to happen.

Policies and documentation

Tables 2.14 and 2.15 show information on the use of early warning systems and linkage of early warning systems to escalation protocols.

Table 2.14 Early warning system used

Early warning system was used	n	%
Yes	376	98.9
No	4	1.1
Subtotal	**380**	
Not Answered	3	
Total	**383**	

Table 2.15 Early warning systems were used and linked to escalation protocols

Early warning system linked to escalation protocols	n	%
Yes	365	97.9
No	8	2.1
Subtotal	**373**	
Not answered	3	
Total	**376**	

It is worth noting that almost all hospitals reported using both an early warning system and a linked escalation protocol. This should be borne in mind when this report refers later to the duration of physiological instability of patients and opportunities for intervention in the pre-cardiac arrest phase.

Table 2.16 shows the presence of policies relating to aspects of resuscitation activities in hospitals and some information about the interface between primary and secondary care. All responding hospitals had policies that covered resuscitation and DNACPR. This was an encouraging finding but the challenge is to ensure that these policies are implemented and that they influence practice in the desired manner; this will be discussed later in the report.

Table 2.17 Where DNACPR decisions were recorded

Where DNACPR decisions were recorded	n	%
Entry in medical notes	278	73.5
Standard pro forma (separate)	330	87.3
Central hospital electronic record	10	2.6
Other	21	5.6

Answers may be multiple (n/378; not answered in 5)

Table 2.17 shows how hospitals record DNACPR decisions. There was a mixture of systems used and this absence of standardisation introduces a risk that not all members of the team may know what action to take in the event of a cardiac arrest.

Table 2.18 Standardisation of DNACPR forms

Standard DNACPR forms were used	n	%
Yes	331	94.8
No	18	5.2
Subtotal	**349**	
Not answered	34	
Total	**383**	

Table 2.18 shows whether standardised DNACPR forms were used. In 18 hospitals they were not used at all, 12 of these were private hospitals.

Table 2.16 Presence of policies related to resuscitation activities

Policies available	n	%
Resuscitation policy	375	97.9
DNAR policy	369	96.3
Patient information leaflets regarding DNAR	204	53.3
Policy for summoning of outreach team	163	42.6
Other resuscitation/cardiac arrest policy	87	22.7
Patient information leaflets regarding resuscitation	85	22.2
An effective way of communicating DNAR to primary/community care	80	20.9
Online access to primary care records	20	5.2

Answers may be multiple (n/383)

The Resuscitation Council (UK) recommends the use of standardised forms to record and communicate DNACPR decisions and provides an example of such a form.[17] (Appendix 1)

Irrespective of the system used, there is a requirement for a robust system to ensure that there is:

- Effective recording of DNACPR decisions in a form that is recognised by all those involved in the care of the patient.
- Effective communication and explanation of DNACPR decisions where appropriate with the patient.
- Effective communication and explanation of DNACPR decisions, where appropriate and with due respect for confidentiality, with the patient's family, friends, other carers or other representatives.
- Effective communication of DNACPR decisions between all healthcare workers and organisations involved with the patient.

It is more likely that these objectives will be delivered by the use of standardised documentation.

DNACPR decisions apply only to the initiation of CPR, and should not be taken to be a decision that limits any other treatment. There may be a place for more sophisticated decisions about levels of intervention or treatment, including CPR and this is discussed later in the chapter on CPR status.

Audit and Governance

Tables 2.19 to 2.21 provide details on audit of resuscitation activities. A Department of Health resuscitation policy (HSC200/028) highlights the requirements placed upon NHS Trust chief executives to ensure that appropriate resuscitation policies which respect patients' rights are in place, understood by all relevant staff, and are accessible to those who need them, and that such policies are subject to appropriate audit and monitoring arrangements.[18]

Table 2.19 Frequency of resuscitation audits

Frequency	n	%
Once per year	80	22.3
Twice per year	37	10.3
More frequently	242	67.4
Subtotal	**359**	
Not answered	24	
Total	**383**	

Table 2.20 Information on the conduct of resuscitation activity for each resuscitation attempt is collected at the hospital

Information collected	n	%
Yes	365	97.9
No	8	2.1
Subtotal	**373**	
Not answered	10	
Total	**383**	

Table 2.21 Patient outcomes that were monitored at the hospital

Outcomes	n	%
Immediate survival	316	89.5
24 hour survival	118	33.4
Survival to discharge	200	56.7
Survival to 6 months	29	8.2
Survival to 1 year	31	8.8
Other	14	4.0

Answers may be multiple (n/353; not answered in 12)

Table 2.19 shows that all hospitals that responded, audited resuscitation activities on at least a yearly basis and that most do this more frequently than 6-monthly (242/359: 67%). Table 2.20 shows that 365/373 hospitals (98%) stated that they collect standardised information about the conduct of each resuscitation attempt. In terms of outcome after cardiac arrest most (90%)

collected immediate survival data following resuscitation attempts but many fewer collected any longer term data; only 33% collected data about survival at 24 hours after cardiac arrest and only 57% collected data about hospital survival (Table 2.21). Whilst it is reassuring to see that resuscitation activities are audited, perhaps hospital survival and functional outcome of survivors (which is considered later in this report), should be given more importance when measuring the effectiveness of resuscitation.

Table 2.22 Hospital had a resuscitation committee

Resuscitation committee	n	%
Yes	337	88.9
No	42	11.1
Subtotal	**379**	
Not answered	4	
Total	**383**	

Table 2.23 Frequency the resuscitation committee met

Frequency	n	%
Once per year	7	2.1
Twice per year	36	11.0
More frequently	283	86.8
Subtotal	**326**	
Not answered	11	
Total	**337**	

Tables 2.22 and 2.23 provide data on hospital resuscitation committees. It can be seen that 42 hospitals did not have a resuscitation committee (36/42 were private hospitals) although this is a key governance committee in most organisations. However, where they did exist it appears that most met more than twice per year.

The questionnaire asked if a local goal for reducing the number of cardiac arrests leading to a resuscitation attempt had been set (Table 2.24).

Table 2.24 Goals were set to reduce the number of cardiac arrests occurring in-hospital

Goals were set	n	%
Yes	80	23.8
No	256	76.2
Subtotal	**336**	
Not answered	47	
Total	**383**	

Quality improvement work has highlighted the importance of goal-setting as a stimulus to change but only 80 hospitals had set any goals to reduce the number of cardiac arrests.

Where goals have been set the range of improvement targets was high. Table 2.25 shows these data.

Table 2.25 Target perentage reduction in the number of cardiac arrests

Target percentage	Total
5-10%	25
11-20%	3
21-30%	8
30-50%	13
51-100%	6
Subtotal	**55**
Not answered	25
Total	**80**

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3 – Patient population, initial assessment and first consultant review

Patient population

This section describes the patient demographics and characteristics on admission to provide an understanding of the patient population and context of the study. Figure 3.1 shows the age range of patients included within the study.

A clinician questionnaire was returned for 585 cases. The median age for the sample included was 77 years (inter-quartile range 68-84). Forty-six percent of the sample was female (272/585).

Comorbidities were reported commonly within the study population. Table 3.1 shows the comorbidities reported on the clinician questionnaire.

Table 3.1 Chronic disease comorbidities

Comorbidities	n	Subtotal
Cardiovascular	341	524
Respiratory	170	491
Renal	133	483
Immunosuppression	50	456
Liver insufficiency	34	451

Answers may be multiple

Figure 3.2 shows body mass index (BMI) for the population where both weight and height were documented (110 patients). Just over one third of the patients was considered to be within normal BMI range (18.5-25), one third was considered to be in the overweight BMI range (25-30) and just over one quarter was considered to be obese (BMI >30). This reflects the BMI range across the current UK population.[19]

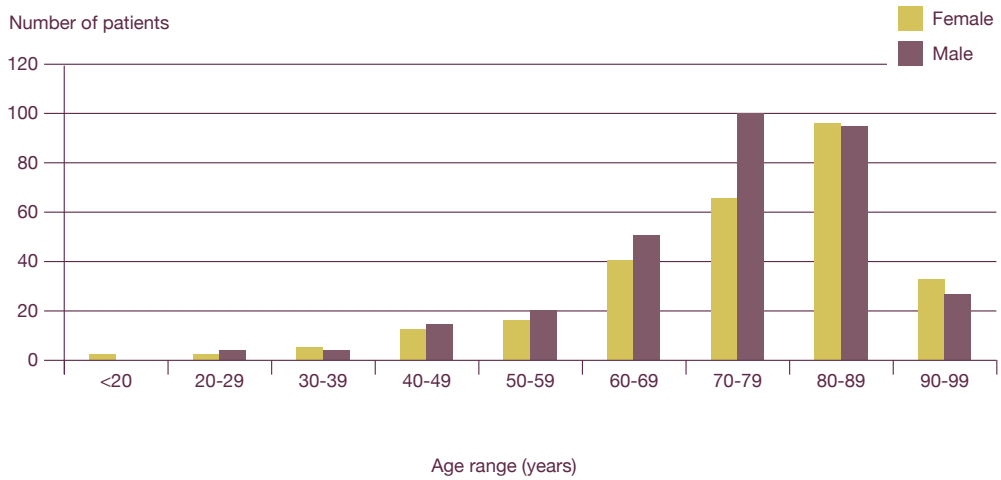

Figure 3.1 Age and gender of the study population *(n=585)*

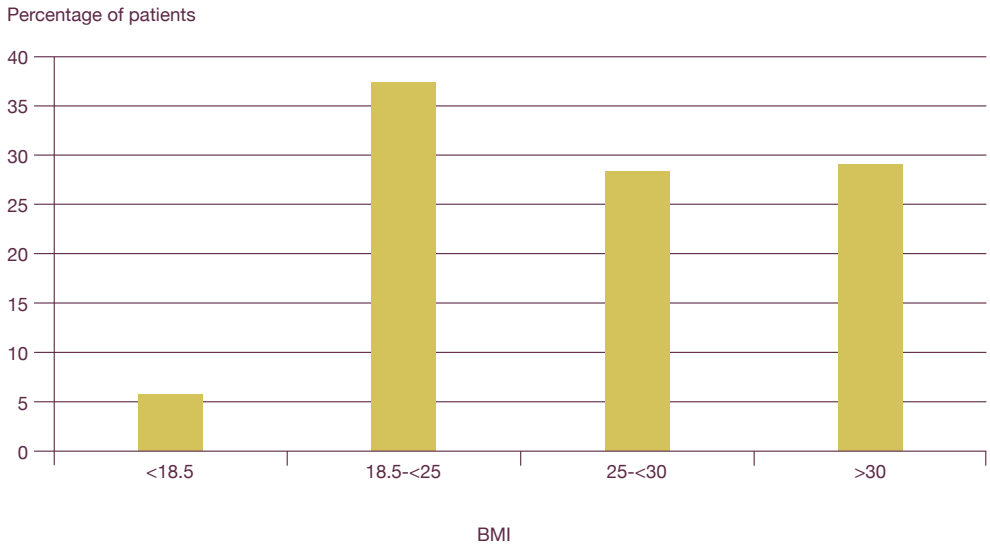

Figure 3.2 BMI of patients, where height and weight were documented *(n=110)*

Definitions were provided on the clinician questionnaire to attempt to standardise the reporting of comorbidities (Appendix 2). These definitions described very severe comorbidities and it is notable that these were reported in such high numbers. In discussions with the Expert and Advisor groups (during the review of the initial data) this high number of severe comorbidities was commented upon. However, from review of the data it is unclear if this was simply due to clinicians not adhering to the definitions supplied or if indeed the population did have this degree of comorbidity. There were 111 patients in the study population with none of the listed comorbidities recorded.

The responsible clinician was also asked to provide details on the likely fatality of condition leading to hospital admission using the McCabe Classification[20] (Appendix 3). This is shown in Table 3.2.

It can be seen that almost 70% of the sample in this study was assessed as having a fatal condition and in 21% of the sample this was considered to be rapidly fatal. It may be expected that consideration of appropriate levels of treatment would be indicated in these patients, and that DNACPR decisions would be considered as CPR in patients with rapidly fatal conditions is frequently futile.

Frailty and functional capability have an important bearing on ability to recover from acute illness. In an attempt to gather information about these aspects the admitting clinician was asked to provide details of the Barthel Index[21] (Appendix 4).

Table 3.2 McCabe Classification

Classification	n	%
Rapidly fatal	109	21.2
Ultimately fatal	236	46
Non fatal	168	32.7
Subtotal	**513**	
Not answered	72	
Total	**585**	

Figure 3.3 shows the percentage of patients who were assessed as having a score of 0 in each domain (0 indicated the poorest level of function in each of these domains). This illustrates that in addition to the challenges of an elderly population (median age 77), with significant comorbidity, high levels of obesity and conditions assessed as fatal or rapidly fatal, there were substantial functional deficits.

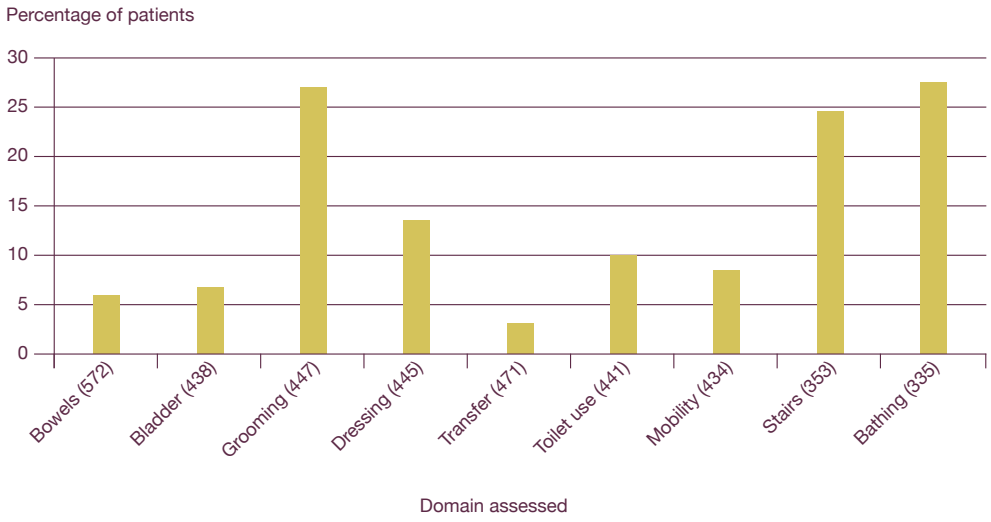

Figure 3.3. Barthel Index of Activities of Daily living: Percentage of patients scoring zero for each domain (i.e. much help required). Denominator for each domain is shown in brackets.

Table 3.3 provides detail on the location of patients prior to hospital admission. The majority of patients were living in their own home prior to hospital admission. Three percent of the study population (19/585) were transferred from a nursing home.

Table 3.3 Patients' location prior to hospital addmission

Location	Total	%
Own home	472	80.7
Another hospital	43	7.4
Nursing home	19	3.2
Other	26	4.4
Unknown	25	4.3
Total	**585**	

Data were not collected on level of independence or need for support to maintain home living, other than the detail of the Barthel Index already shown.

Table 3.4 shows the time of initial admission to hospital. These data were available for 506/585 cases. Most patients arrived during daytime (08:00 to 17:59) and less than one fifth arrived in the overnight period (00:00-07:59)

Table 3.4 Time of admission to hospital

Time	n	%
00:00-07:59	91	15.6
08:00-17:59	270	46.2
18:00-23:59	145	24.8
Unknown	79	13.5
Total	**585**	

Table 3.5 Location that patients were first admitted to

Type of ward	n	%
Medical ward	221	37.8
Emergency department	114	19.5
Surgical ward	83	14.2
Coronary care unit	54	9.2
Level 3 care	13	2.2
Level 2 care	4	<1
Outpatient department	1	<1
Other	89	15.2
Unknown	6	1.0
Total	**585**	

Figure 3.4 shows the day of the week on which patients were admitted to hospital. The numbers of patients admitted on each weekday were greater than the numbers admitted on a Saturday or Sunday.

The most frequent location the patient was admitted to was a medical ward (38%), emergency department (20%), surgical ward (14%) and coronary care unit (CCU) (9%). The 'other' category includes assessment units (31 cases), cardiac catheter labs (10 cases) and stroke units (4 cases). It is likely that many of these patients were admitted via the emergency department and the detail in Table 3.5 reflects the first definitive admission location. Furthermore there is possible confusion between the definition of the emergency department and assessment units (often co-located with the emergency department) and between medical wards and medical assessment units. Finally many hospitals have different arrangements that may not fit neatly into the categories above.

Figure 3.5 provides detail on urgency and route of admission. It can be seen that 7% of the sample population was a planned admission, 7% was inter-hospital transfers and the remainder were mostly admitted as emergency admissions, mainly through the emergency department.

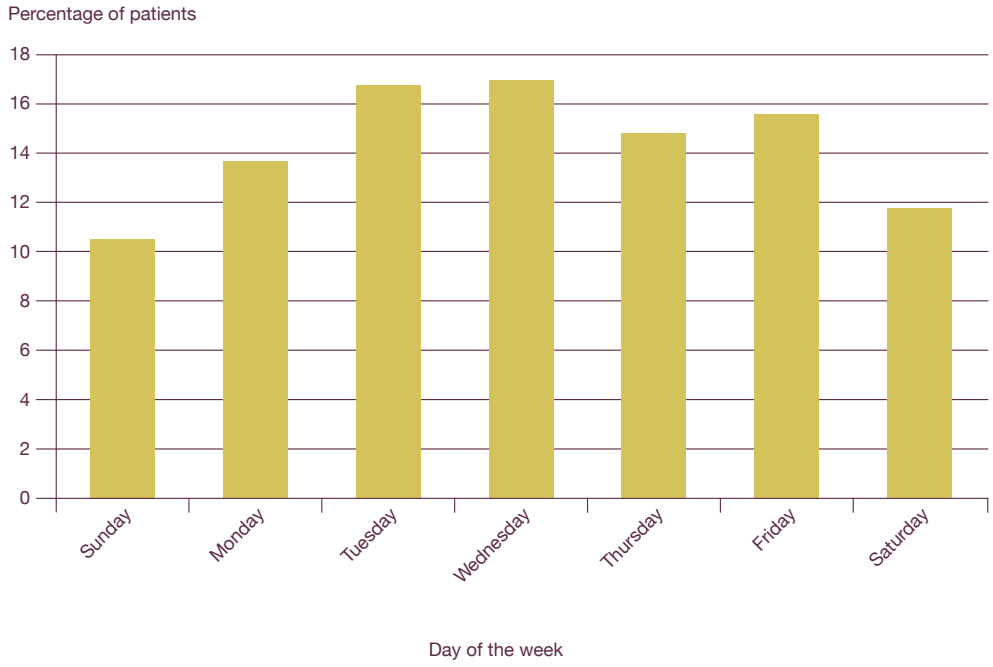

Figure 3.4 Day of the week patients were admitted to hospital *(n= 585)*

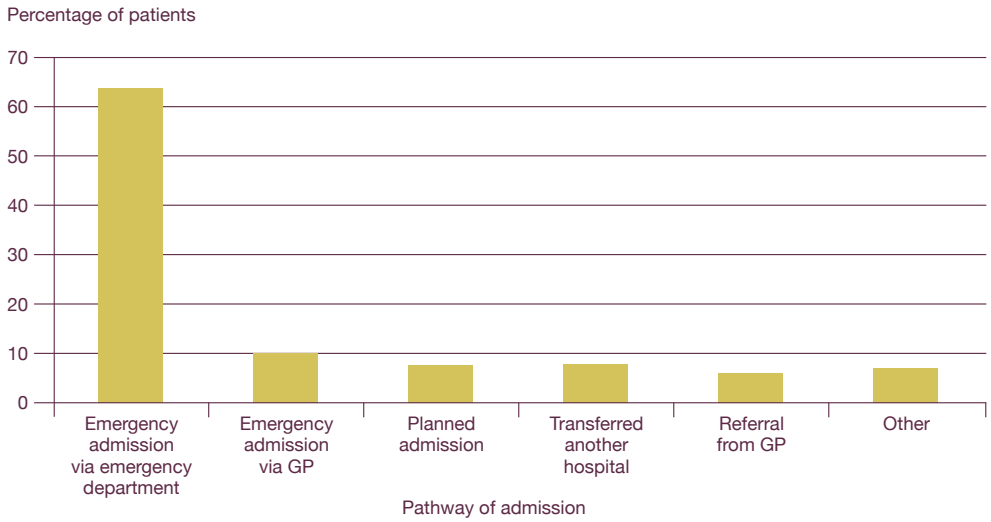

Figure 3.5 Pathway of admission *(n=578, not answered in 7)*

Initial assessment

Considerable detail was requested and analysis made on the admission process to hospital. This was based on the premise that rapid, complete and accurate assessment of patients was likely to lead to prompt, appropriate and comprehensive care. Conversely, if the initial direction of care was incorrect then it was more likely that subsequent management could be adversely affected. Table 3.6 shows where the data for this analysis was obtained from.

Table 3.6 Source of data used to assess admission process

Source	n	%
Clerking on admission to ward	239	47.0
Emergency department assessment	132	26.0
Both	137	27.0
Subtotal	**508**	
Not answered	18	
Total	**526**	

If both emergency department assessment and clerking on admission to a ward were available then the assessment considered both, and used the best data available (for example the most senior grade of either the emergency department doctor or ward doctor was used). For three quarters of the patients the ward assessment was used, either alone or in conjunction with the emergency department assessment.

Table 3.7 Time of the initial assessment

Time	Total	%
00:00-07:59	100	23.1
08:00-17:59	201	46.4
18:00-23:59	132	30.5
Subtotal	**433**	
Unknown	93	
Total	**526**	

Table 3.7 shows the time of initial assessment. These data are similar to time of hospital admission although slightly fewer were assessed during daytime and more assessed out of hours when compared to the admission time, suggesting that patients admitted during the day have some delays in assessment.

The grade of clinician making the initial assessment is shown in Table 3.8 and the definitions of grade are included in Appendix 5.

Table 3.8 Grade of clinician undertaking the initial assessment

Grade of clinician	n	%
Consultant	11	3.0
Staff grade/associate specialist	3	<1
Trainee with CCT	3	<1
Senior specialist trainee	38	10.5
Junior specialist trainee	39	10.8
Basic grade	241	66.6
Specialist nurse practitioner	5	1.4
Other registered nurse	13	3.6
Resuscitation officer	2	<1
Other	7	1.9
Subtotal	**362**	
Unknown	164	
Total	**526**	

Information on grade of clinician was only available in 362 cases, largely due to non-documentation of grade in the case notes. However, it can be seen that initial assessment was performed almost wholly by doctors in training and the majority of that was by basic grade doctors. Information on the specialty of the doctor making the initial assessment was also collected and it was found that the majority of assessments were made by emergency medicine, medicine and cardiology.

Table 3.9 shows the grade of clinician making the initial assessment assessed against time of day of the assessment. Basic grade doctors performed the majority of initial assessments at all times of the day but were responsible for a much higher proportion of assessments during normal working hours than out of hours. There may be an opportunity to improve both training and decision making by increased involvement of senior staff with these patients.

Table 3.9 Grade of clinician undertaking the initial assessment by the time of day

	Time of assessment					
Grade of clinician	**00:00-07:59**	**08:00-17:59**	**18:00-23:59**	**Subtotal**	**Not answered**	**Total**
Consultant	1	4	2	**7**	4	**11**
Staff grade/ associate specialist	1	1	1	**3**	0	**3**
Trainee with CCT	0	0	1	**1**	2	**3**
Senior specialist Trainee	9	12	11	**32**	6	**38**
Junior specialist trainee	14	12	11	**37**	2	**39**
Basic grade	45	105	62	**212**	29	**241**
Specialist nurse practitioner	3	1	1	**5**	0	**5**
Other registered nurse	1	4	3	**8**	5	**13**
Resuscitation officer	0	1	1	**2**	0	**2**
Other	1	3	2	**6**	1	**7**
Subtotal	**75**	**143**	**95**	**313**	**49**	**362**
Unknown	25	58	37	**120**	44	**164**
Total	**100**	**201**	**132**	**433**	**93**	**526**

History and examination

An accurate and complete history is important to ensure a full understanding of the acute presentation and provide the context of previous conditions, treatments and functional status. The Advisors considered this aspect of the admission process in detail and the number of cases where elements of the history were not obtained or were incomplete are shown in Figure 3.6. The denominator is less than the 526 cases due to lack of data to assess in a number of cases.

It can be seen that there was a substantial number of cases where elements of the history were not obtained. The major missing elements were drug history, social history and information on activities of daily living. In only 164 cases were all elements of the history obtained. In some cases it may have been appropriate to limit the initial history or the circumstances may have not allowed all the elements of the history to be obtained. In addition some of this information may be contained in other parts of the medical record; for example information on activities of daily living may have been recorded in the nursing notes. For this reason the Advisors were asked to give an overall impression of the adequacy of the history in the context of that particular case. This is shown in Table 3.10.

Table 3.10 Adequacy of the past medical history taken - Advisors' opinion

Adequate history was taken	n	%
Yes	419	85.7
No	70	14.3
Subtotal	**489**	
Unknown	37	
Total	**526**	

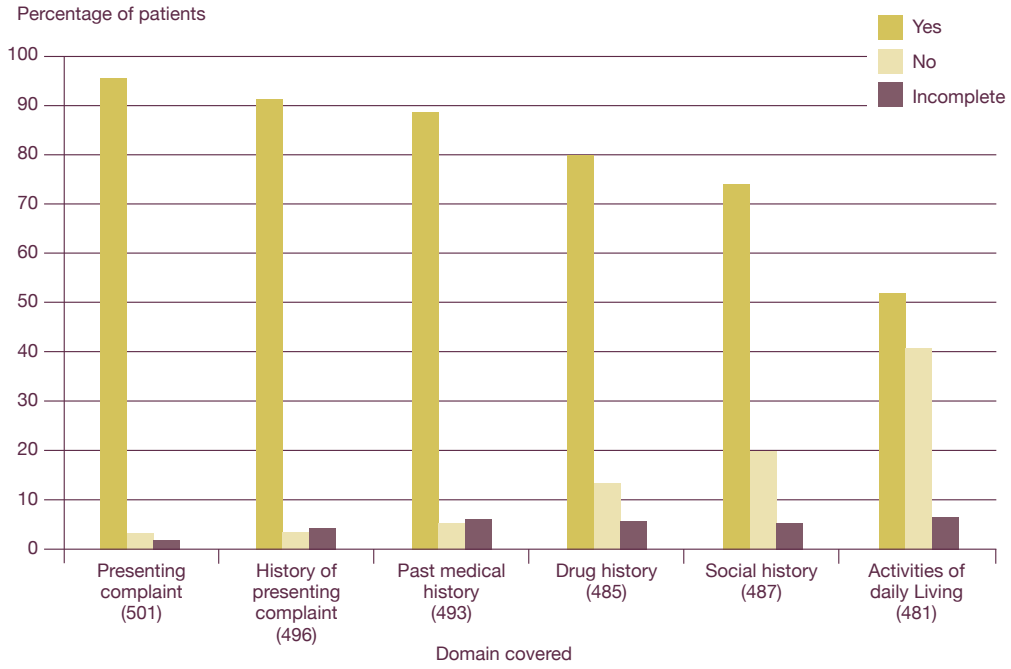

Figure 3.6 Elements of medical history covered by initial assessment
(the denominator for each domain is shown in brackets).

When assessed in the context of each particular case the Advisors were of the opinion that in almost 15% of cases an adequate history had not been obtained during the initial admission process that could be determined from reviewing the medical or nursing notes.

Similarly, assessment of elements of physical examination was performed by the Advisors. Table 3.11 shows a summary of these data.

Table 3.11 Assessment of elements of physical examination determined by the Advisors

System assessed	n	%
Cardiovascular system	448	93.5
Respiratory system	432	90.2
Gastrointestinal system	362	75.6
Central nervous system	290	60.5
Genitourinary system	120	25.1
None	17	3.5

Answers may be multiple (n/479; not answered in 13 and insufficient data in 34)

It can be seen that there was a substantial number of cases where physical examination of particular systems was not performed. As with history-taking it may be appropriate not to carry out a full systematic examination in all cases; the clinical scenario may lead to a focused clinical examination. To account for this, Advisors were asked to consider whether the clinical examination was adequate at first contact (in the context of each particular case). Table 3.12 shows that Advisors considered clinical examination incomplete in one in four cases.

Table 3.12 Completeness of clinical examination at the first contact - Advisors' opinion

Complete clinical examination	n	%
Yes	362	75.6
No	117	24.4
Subtotal	**479**	
Unknown	47	
Total	**526**	

Professional standards for admission and assessment are available.[22] It appears, in the opinion of the Advisors, that the practice found in this patient population fell short of these standards in many cases.

Outputs from initial assessment

The key outputs from the initial assessment process are: diagnosis or differential diagnosis, investigation plan, treatment plan and monitoring plan. The Advisors' opinion on whether these elements had been performed and documented or not are shown in Figure 3.7.

These data show that only 73% of patients had a recorded diagnosis or differential diagnosis, 84% had a plan of investigations, only 77% had a treatment plan, and only 29% had a monitoring plan. It would appear that these are important deficits and could represent an obstacle to timely and effective patient treatment. Furthermore the lack of a monitoring plan increases the chance of unrecognised deterioration and lack of escalation in the event of deterioration.

It may well be that some areas or hospitals have a default monitoring plan and that this explains the low level of direction from admitting medical staff in this domain in this sample of cases. However, it would still be good practice for the admitting doctor to set some parameters (e.g. initial frequency or type of observations) to ensure a safe baseline and little evidence of this could be found.

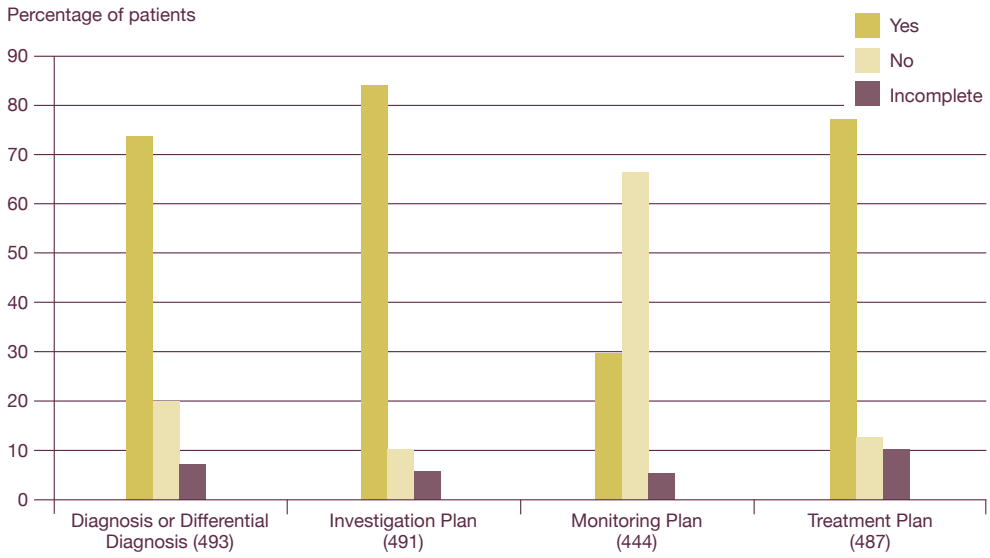

Figure 3.7 Outputs from initial assessment *(denominator for each question is shown in brackets)*

History and examination should allow an assessment of severity to be made by the admitting doctor. Table 3.13 shows the Advisors' opinion on whether the admitting doctor appreciated the severity of the situation.

Table 3.13 Severity of condition recognised by the admitting doctor - Advisors' opinion

Severity of the situation was appreciated	n	%
Yes	342	82.2
No	74	17.8
Subtotal	**416**	
Unknown	110	
Total	**526**	

Table 3.14 shows the grade of clinician who performed the initial assessment in those 74 cases where the Advisors believed the severity of the situation was not appreciated.

Table 3.14 Grade of clinician making the initial assessment where severity of the situation was not recognised - Advisors' opinion

Grade of clinician	Total
Consultant	2
Staff grade	1
Senior specialist trainee	3
Junior specialist trainee	4
Basic grade	34
Specialist nurse practitioner	1
Other registered nurse	3
Other	2
Subtotal	**50**
Not answered	24
Total	**74**

As basic grade doctors performed the majority of initial assessments it is unremarkable that they assessed the majority of the cases in Table 3.14. It is also recognised that basic grade doctors may not have the skill or experience to make a correct assessment of complex and challenging situations. It may be that they are being asked to assess and provide initial treatment for patients when they do not have the competency to do so. This raises the issue of training, to ensure that doctors are suitably skilled for the tasks they are required to undertake, and suitably supervised, to ensure that delivery of tasks is adequate, that staff are supported and that patient safety is maintained.

Part of good care is escalating the care of the patient to more senior members of the team when necessary. Table 3.15 shows the Advisors' opinion of this domain. In almost one in six cases the Advisors were of the opinion that escalation of care to more senior team members did not occur in a timely manner.

Table 3.15 Timely escalation of care - Advisors' opinion

Timely escalation of care	n	%
Yes	286	82.4
No	61	17.6
Subtotal	**347**	
Escalation not required	59	
Unknown	120	
Total	**526**	

There are many possible reasons why escalation did not happen in a timely manner. Working patterns, availability of staff and workload may have been contributing causes. However, one major constraint was lack of appreciation of the situation and lack of awareness that escalation of care may be required. Table 3.16 gives some detail on this aspect.

Table 3.16 displays escalation by appreciation of the severity of the situation. In 23 cases the doctor involved did not appear to appreciate the severity of the situation and did not escalate in a timely manner in the opinion of the Advisors.

Improved training and supervision are required to address this problem as it is difficult to criticise the decision not to escalate the care if the situation is not fully appreciated. In 31 cases the doctor involved did appreciate the severity of the situation but still did not escalate the care of the patient to a more senior doctor; this was approximately one in ten. This study did not collect data to describe the reasons behind this problem but anecdotally the view of the clinicians involved with this study recognised culture or unwillingness to ask for help, workload, competing demands and lack of support as some of the possible factors.

Case study 1 gives an example of where escalation would have been appropriate.

Table 3.16 Timely escalation against appreciation of the severity of illness by the clerking doctor - Advisors' opinion

	Appreciation of the severity of situation			
Timely escalation of care	**Yes**	**No**	**Unknown**	**Total**
Yes	216	31	39	286
No	31	23	7	61
Subtotal	**247**	**54**	**46**	**347**
Escalation not required	44	4	11	59
Unknown	51	16	53	120
Total	**342**	**74**	**110**	**526**

Case study 1

An elderly patient was admitted to a medical assessment unit because of shortness of breath. The patient had a long past medical history including life-long smoking, diabetes, ischaemic heart disease, previous coronary artery surgery, heart failure and chronic kidney disease. The patient was assessed promptly by an FY2 doctor who made a differential diagnosis of heart failure or chest infection and started treatment with antibiotics and increased diuretics. At the time the patient was distressed and unable to speak, oxygen saturations were 84% on high-flow oxygen, respiratory rate was 32 breaths per minute, blood pressure was 85/45 mmHg, pulse rate 140 beats per minute (atrial fibrillation) and arterial blood gasses showed a compensated metabolic acidosis. There was no record of escalation to more senior doctors.

Six hours after admission to the medical assessment unit the patient had a PEA cardiac arrest and despite prompt CPR that continued for 15 minutes the patient could not be resuscitated. The patient had not been reviewed by any senior doctors prior to this.

Advisors raised concerns about recognition of severity of situation and escalation to more senior doctors. They also raised concern that there was no intervention to treat rapid atrial fibrillation. The Advisors considered that more senior involvement may have lead to a referral for higher level of care and also that CPR status may have been considered.

Patient management until first consultant review or 24 hours if no consultant review

The data presented in this section relate to aspects of patient management after the initial assessment and up to the time of first consultant review (or first 24 hours if consultant review was not evident).

Table 3.17 shows that a diagnosis or differential diagnosis was recorded in 9 out of 10 cases.

Table 3.17 Differential diagnosis was made and recorded during the initial review

Diagnosis or differential diagnosis was made	n	%
Yes	442	91.1
No	43	8.9
Subtotal	**485**	
Unknown	41	
Total	**526**	

In the opinion of the Advisors the correct diagnosis (or the differential diagnosis list included the correct diagnosis) was recorded in 9 out of 10 of these cases. (Table 3.18)

Table 3.18 Correct diagnosis was included - Advisors' opinion

Correct diagnosis	n	%
Yes	359	89.3
No	43	10.7
Subtotal	**402**	
Unknown	40	
Total	**442**	

Table 3.19 shows the Advisors' opinion of treatment plan in this phase of care (initial assessment to initial consultant review, or first 24 hours if no consultant review identified).

Table 3.19 Appropriateness of the treatment plan - Advisors' opinion

Treatment plan was reasonable	n	%
Yes	409	83.5
No	81	16.5
Subtotal	**490**	
Insufficient data	36	
Total	**526**	

Advisors were unable to give an opinion on the reasonableness of treatment plan in 36 patients. However in those with sufficient data it was thought that 16.5% of cases did not have a reasonable treatment plan relating to their condition.

Matters raised by the Advisors as being related to treatment provided to the patient were categorised into appropriateness of treatment and timeliness of treatment. These Advisor opinions are shown in Table 3.20.

Table 3.20 Timely treatment against appropriate treatment - Advisors' opinion

Treatment was timely	Treatment was appropriate		
	Yes	No	**Total**
Yes	353	28	**381**
No	44	34	**78**
Total	**397**	**62**	**459**

Not answered in 67 cases

Only 353 patients out of the 459 with data for full assessment had both appropriate and prompt therapy (77% of cases). There was inappropriate treatment in 62/459 cases (14%) and delays in treatment in 78/459 cases (17%). Case study 2 shows an example of this.

Case study 2

A very elderly patient was admitted to hospital following "collapse". On admission their heart rate was recorded at 35 beats per minute and an ECG showed complete heart block. Blood pressure was low and the patient was unable to sit up in bed due to postural hypotension and dizziness. The patient was admitted to the coronary care unit. There was no treatment plan to correct the bradycardia. Consultant review (24 hours later) confirmed complete heart block and noted a plan to insert a permanent pacemaker. Over the next 36 hours the patient's heart rate was documented regularly between 30 and 35 beats per minute. An asystolic cardiac arrest occurred three days after admission to hospital and before the permanent pacemaker had been inserted.

This case appeared to highlight both unacceptable delays and inadequate treatment. A temporary pacemaker could have been inserted or permanent pacing expedited and this may have avoided the cardiac arrest. The Advisors considered that this was a potentially avoidable death.

Table 3.21 Resuscitation status recorded

Decision about CPR status was recorded	n	%
Yes	44	10.1
No	391	89.9
Subtotal	**435**	
Insufficient data	91	
Total	**526**	

Table 3.21 provides data on resuscitation status decisions during the admission period: for clarity that was the period of initial admission, assessment and planning up to the first consultant review.

Whether or not the consultant considered the CPR status will be looked at later under the 'first consultant review'.

These data included patients in whom it could be assessed that a decision had been made that either CPR would be attempted and also patients in whom CPR would not be attempted (DNACPR). It must be remembered that this group of patients all ended up having a resuscitation attempt.

Case study 3

An elderly patient was admitted to hospital from a nursing home with abdominal pain and vomiting. Past medical history included diabetes, atrial fibrillation, ischaemic heart disease and dementia. The patient was very dependent on help with activities of daily living. On assessment the patient was noted to be very frail. Blood pressure was unrecordable and the patient was unrouseable. Biochemistry revealed severe renal impairment (urea 32 mmol/l, creatinine 507 microm/l), a profound metabolic acidosis (pH 7.05) and raised lactate (12 mmol/l). The patient was reviewed jointly by ST2 doctors from medicine and surgery who decided that at that time the patient was not stable enough to have CT of the abdomen but that ischaemic bowel was the most likely diagnosis. The plan was to commence fluid resuscitation and re-assess. It was noted that the outcome was likely to be poor but no decision about CPR status was documented. More senior doctors were not consulted. The patient had a cardiac arrest 4 hours later and underwent 10 minutes of CPR. This was unsuccessful.

The Advisors raised concerns that there was a lack of appreciation of the severity and urgency in this case and that escalation to senior doctors should have taken place and CPR status considered.

Advisors were asked if, from the information available to them in the questionnaires and case notes, they believed that the actual actions regarding DNACPR status on admission were appropriate; these data are shown in Table 3.22.

Table 3.22 Actions regarding DNACPR status were appropriate - Advisors' opinion

Appropriate DNACPR status	n	%
Yes	237	63.2
No	138	36.8
Subtotal	**375**	
Insufficient data	151	
Total	**526**	

In 138 cases it was felt that the action was inappropriate, and in 89 of these cases it was felt that a DNACPR decision should have been made (but had not been made). It is well recognised by all doctors that it can be challenging to make decisions about appropriateness of CPR within a short time period after admission but procedures should be in place to do so when such a decision is indicated.

It must be noted that more generally, many patients do have DNACPR decisions made and many deaths in hospital occur without CPR attempts. This is good practice where death is an inevitable outcome and CPR will not work. This study only assessed care in patients who underwent a CPR attempt and so did not measure, or assess, this level of good practice.

One point raised during this study was the lack of evidence of an explicit decision about resuscitation status in the majority of patients in the study. Table 3.21 shows that there was no explicit decision and documentation of resuscitation status in 90% of cases on admission. This lack of clarity is a potential source of confusion. The position that CPR should be attempted as a default may lead to inappropriate CPR attempts. Perhaps more importantly this becomes the default position without truly examining if CPR will work or is indicated.

Should the intent to, as well as not to, undertake an intervention of this magnitude be clearly recorded in patients who are acutely unwell, and a system used so that all members of the team are aware of this decision? The requirement to record this information will encourage consideration, discussion where appropriate and clarity on the intent and likely outcome should the patient have a cardiac arrest. It can also be used as an audit standard to assess practice against.

Case study 4

A very elderly patient was admitted to hospital after collapsing at home. On admission they had a GCS of 9. A CT scan of their brain revealed extensive subarachnoid haemorrhage and the patient was admitted to a ward for ongoing care. Over the next 24 hours the patient's condition deteriorated and they became more obtunded. At the request of family members a chaplain visited to offer comfort. Sixteen hours later the patient had a cardiac arrest and the resuscitation team was summoned. CPR was initiated and continued for approximately 10 minutes. No return of circulation was achieved and death was certified. It appeared that death was the expected outcome in this case but a plan for what to do in the event of cardiac arrest had not be written down.

The Advisors considered that this CPR attempt appeared inappropriate and was an undignified process at the end of life.

Table 3.23 provides data on the Advisors' global assessment of whether there were deficiencies present in the initial assessment and treatment phase. As can be seen it was felt that there were deficiencies in 47% of cases. As discussed before, it is more likely that treatment will be compromised if the initial phase is either delayed or directs attention in the wrong direction.

Table 3.23 Deficiencies in initial assessment - Advisors' opinion

Deficiencies in the initial assessment	n	%
Yes	230	47.6
No	253	52.4
Subtotal	**483**	
Insufficient data	43	
Total	**526**	

Deficiencies were present in all domains, as shown in Table 3.24.

Table 3.24 Areas of deficiencies in care - Advisors' opinion

Deficiencies	n	%
Decision making with regards to CPR status	107	48.0
Examination	85	38.1
Treatment plan	79	35.4
Diagnosis	76	34.1
Recognition of severity of illness	69	30.9
Seniority of doctor	68	30.5
History taking	60	26.9
Monitoring	66	29.6
Investigation	66	29.6

Answers may be multiple (n/223; not answered in 7)

Many of these deficiencies were in basic elements of medical practice. This raises the more general question as to whether the current structure and process for the initial assessment and treatment of emergency patients is fit for purpose.

The Academy of Medical Royal Colleges recently published a report titled 'The benefits of consultant delivered care'[23] This concludes that there are real evidence based benefits to moving to a system of consultant-delivered care. Principle benefits include rapid and appropriate decision making and improved outcomes. This document is very pertinent to the care of the acutely unwell patient cohort examined in this report.

Case study 5

A middle aged patient was admitted to hospital with severe chest pain. The patient was known to have a thoraco-abdominal aortic aneurysm and surgical or radiological intervention had previously been ruled out following multidisciplinary team assessment. The patient had chronic lung disease and home oxygen therapy had been prescribed. The patient was hypotensive and appeared pale. Fluids, oxygen and analgesia were prescribed whilst basic investigations were started. The impression was that this was a leaking aneurysm. Little analgesia was given due to concerns over respiratory depression and the patient continued to complain of severe pain. Four hours after admission to the surgical assessment unit the patient had a cardiac arrest. CPR was commenced and continued for 20 minutes until the on-call surgical consultant arrived. CPR was stopped after assessment of the situation at that time and death confirmed.

This case highlighted the need to assess likely outcomes in acutely ill patients and ensure that CPR is not commenced when it will not work. The Advisors commented that earlier consultant review may have facilitated better care. This is a challenge in all clinical care settings.

Table 3.25 shows the initial care location grouped by Advisor opinion of level of care [24] (see definitions of level of care in Appendix 6).

Table 3.25 Initial location where care was provided

Level of care	n	%
Level 1 care	402	83.2
Level 2 care	62	12.8
Level 3 care	19	3.9
Subtotal	**483**	
Unknown	43	
Total	**526**	

Table 3.26 Actual level of care provided assessed by Advisors' opinion of where the patient should have gone

	Level of care				
Advisors' opinion of required level of care	**Level 1 care**	**Level 2 care**	**Level 3 care**	**Unable to answer**	**Total**
Level 1 care	355	0	1	9	**365**
Level 2 care	35	61	0	13	**109**
Level 3 care	2	0	18	1	**21**
Subtotal	**392**	**61**	**19**	**23**	**495**
Unknown	10	1	0	20	**31**
Total	**402**	**62**	**19**	**43**	**526**

It appears that patients who received Level 2 or Level 3 care received an appropriate level of care. However there were concerns raised relating to the group who received Level 1 care. In almost one in ten cases of this group it was agreed by the Advisors that a higher level of care should have been provided.

First consultant review

The first consultant review of a newly-admitted patient is a vital process. Royal Colleges have highlighted the importance of consultant review to ensure good treatment and have produced guidelines and standards to promote early consultant involvement.[25,26]. More recently the Academy of Medical Royal Colleges has highlighted the benefits of, and need to move towards, consultant delivered care.[23] Not only is the first consultant review a vital safety net for the patient; it is also an essential training opportunity for junior doctors and other health professionals.

Table 3.27 shows if the first consultant review could be identified from the case notes provided.

Table 3.27 First consultant review was recorded in the case notes

First consultant review recorded	n	%
Yes	277	53.2
No	244	46.8
Subtotal	**521**	
Insufficient data to assess	5	
Total	**526**	

The first consultant review could only be identified in 277 cases (53%). Where consultant review could not be identified it was not clear how often patients had not been seen and how often the review had not been recorded clearly enough to permit its recognition. Only the first 24 hours of case notes were requested in addition to the notes for the 48 hours preceding cardiac arrest. If consultant review did not take place within 24 hours of admission then the Advisors would not have the documentation to find it.

Figure 3.8 shows time to first consultant review. This could only be determined in 198 of the 277 cases where consultant review could be identified.

In 48% of cases, when times could be identified, first consultant review occurred more than 12 hours after admission. This does not adhere to professional guidelines[27,28] and appears to be a deficiency in the provision of appropriate care.

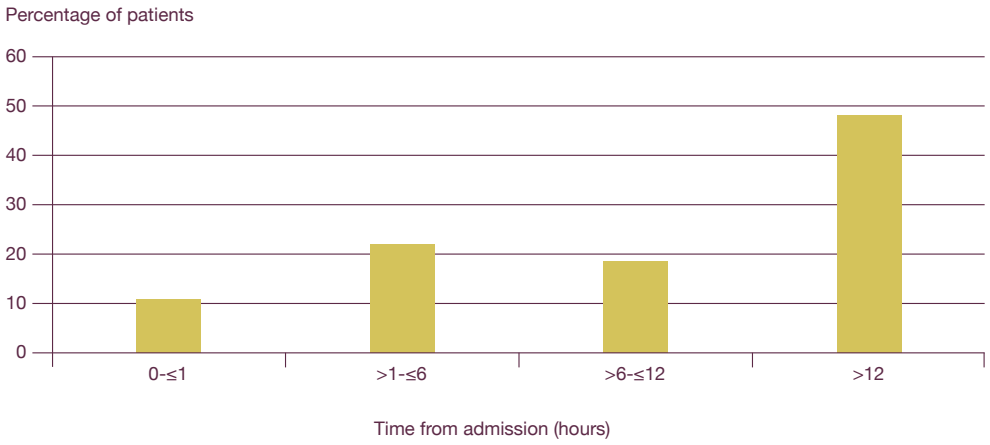

Figure 3.8 Timing of first consultant review *(n=198, data missing in 79)*

Advisors were asked to consider if the first consultant review was timely. Table 3.28 shows this data.

Table 3.28 Timely consultant review - Advisors' opinion

Timely consultant review	n	%
Yes	212	82.5
No	45	17.5
Subtotal	**257**	
Unknown	20	
Total	**277**	

Of the 45 cases in which the Advisors considered the timing of consultant review to be inappropriate, in 25 cases review occurred more than 12 hours. In three cases, the review took place in less than 12 hours.

There was a difference between the number of patients reviewed later than 12 hours after admission and the number in whom the Advisors felt that consultant review was not within an appropriate time period. Whilst this may give reassurance that longer delay to consultant review may be acceptable sometimes it must be remembered that early consultant review is a professional standard and it provides support to the more junior members of the team. As shown earlier, there were deficiencies in junior doctors' appreciation of severity and urgency of the situation and lack of escalation was a problem. Early consultant review is an essential safety net and whilst in some cases it may not be required it needs to be applied consistently to ensure that patients in whom it is essential are not missed.

Table 3.29 shows the Advisor opinion of timeliness of consultant review by time of day. Patients admitted during the daytime were considered not to have had a timely review in 19% of cases compared with 9% for patients admitted in the evening and overnight period.

Data were not collected to explore the reason for this difference, although during the case review process it was clear that competing work commitments (e.g. clinic attendance) was one possible reason for this reduced timeliness during the normal working day.

Table 3.29 Consultant review was within an appropriate timeframe for the patients' condition by time of admission

	Consultant review within appropriate timeframe			
Time of admission	**Yes**	**No**	**Unknown**	**Total**
00:00-07:59	33	4	5	42
08:00-17:59	105	27	9	141
18:00-23:59	54	6	3	63
Subtotal	**192**	**37**	**17**	**246**
Not answered	20	8	3	31
Total	**212**	**45**	**20**	**277**

Table 3.30 Changes in management of care following consultant review

Changes made in:	n	%
Investigations	100	39.1
Monitoring	29	11.3
Diagnosis	34	13.3
Other	82	32.0
No evidence of change	83	32.4

Answers may be multiple (n/256; not answered in 21)

Table 3.30 shows the changes were made following consultant review. In two thirds of patients changes to their management were made following consultant review. The diagnosis was changed in 13% of cases and further investigations requested in 39% of cases. The impact of consultant review on patient care appears to be substantial. This demonstrates the need for, and benefit of, early review by a consultant.

Table 3.31 CPR status was considered

CPR status was considered	n	%
Yes	31	13.2
No	203	86.8
Subtotal	**234**	
Unknown	43	
Total	**277**	

Table 3.31 shows consideration of CPR status in those patients in whom consultant review could be identified. In 13% of cases was a CPR decision considered. In view of the comorbidities, functional impairment and potential fatality of this patient cohort it may be suggested that a greater number of patients should have had a DNACPR decision at consultant review, as this figure varies little from the consideration given during the inital assessment (Table 3.21).

However, it is possible that the issue of CPR may have been considered but no documentation was made of this fact, as the default position would be to leave the patient for CPR. Lack of transparent decision making and recording of decisions about CPR status in acutely ill patients is an obstacle to good patient care.

Table 3.32 shows the Advisors' opinion of the quality of the admission process. The period considered was from admission until first consultant review or if no consultant review could be identified then the first 24 hours after admission.

Table 3.32 Quality of admission process - Advisors' opinion

Rating	n	%
Good	145	51.2
Adequate	110	38.9
Poor	28	9.9
Subtotal	**283**	
Insufficient data to assess	243	
Total	**526**	

Case study 6

A middle-aged patient was admitted to hospital with an infective exacerbation of chronic lung disease. This was the fourth admission within the previous 12 months. At home, the patient was housebound and unable to walk more than 10-15 metres due to breathlessness. The admission process and initial treatment were excellent and confirmed at consultant review which occurred within 12 hours of admission to hospital. At this review, after discussion with the patient, it was agreed that care would not be escalated to tracheal intubation and ventilation should the patient fail to respond to treatment. CPR status was not discussed or documented. The patient had a cardiac arrest 48 hours after hospital admission and underwent a 25 minute period of unsuccessful CPR.

CPR was unlikely to work in this case and, in the opinion of the Advisors, a DNACPR decision should have been made and documented. Whilst DNACPR in the event of a cardiac arrest does not stop the provision of other active treatment measures to prevent deterioration, it appeared that there may have been a concern that making a DNACPR decision would result in less than full treatment and contribute to poor outcome.

Quality of the admission process was rated as good in half the cases where it could be assessed. This leaves a considerable number of cases where there was scope for improvement in this aspect of initial patient care. However, it is also remarkable that in half the cases the information recorded in the case notes was insufficient to make an overall assessment.

Key Findings

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

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)*

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)*

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4 – Care before the cardiac arrest

This chapter provides details of patient care in the 48-hour period leading up to the cardiac arrest and attempted CPR, the data are taken from the clinician questionnaire.

Figure 4.1 shows data on patient location at the time of attempted CPR. Approximately half of patients were on either medical or surgical wards and a quarter were on either coronary care unit or Level 2 care.

The clinician caring for the patient was asked in the questionnaire if this was the correct location for the patient. Table 4.1 shows these data.

Table 4.1 Appropriate ward for the care needed by the patient

Appropriate ward	n	%
Yes	521	92.2
No	44	7.8
Subtotal	**565**	
Unknown	20	
Total	**585**	

This question was not answered in 20 cases but in the remainder it was the opinion of the responsible clinician that the patient was on the correct ward in 92% of cases.

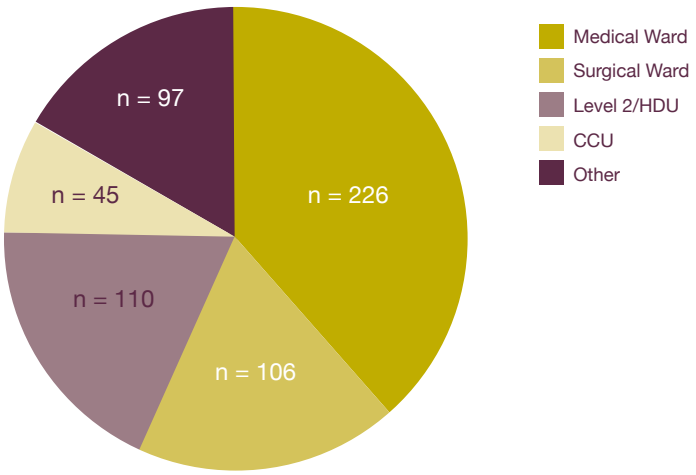

Figure 4.1. Type of ward the patient was on at the time of cardiac arrest
(n=584, not answered in one)

Table 4.2 shows that of the 44 patients who the clinicians felt were in the wrong location 24 patients should have been cared for in CCU/Level 2 or Level 3 care area.

Table 4.2 Location where the patients should have been cared for - Responsible clinicians' opinion

Location	Total
Level 3 care	3
Level 2 care	13
Coronary care unit	8
Surgical ward	2
Medical ward	7
Other	10
Subtotal	**43**
Not answered	1
Total	**44**

The duration between hospital admission and deterioration to cardiac arrest is important in the context of this study. Figure 4.2 shows these data.

Thirty-two percent of patients had been in hospital for less than one day prior to their cardiac arrest. This group may be the most challenging in terms of ensuring senior review, treatment-planning and decision-making regarding CPR in the event of a cardiac arrest. However this was a minority of patients in this study and 68% of the cases included had a hospital stay of longer than one day prior to cardiac arrest. Of the whole group 29% had been in hospital for longer than one week. It would appear that in most cases there is opportunity to consider, decide on, and discuss (where appropriate) CPR in the event of a cardiac arrest.

It is possible that some patients are admitted to hospital and subsequently develop an unrelated acute problem and have an unanticipated cardiac arrest. In these patients, despite an in-patient stay of several days, there may be little warning of cardiac arrest. However, these patients are likely to be the minority as it is known that most patients who have an in-patient cardiac arrest have warning signs and it is a predictable event not caused by primary cardiac disease.[4]

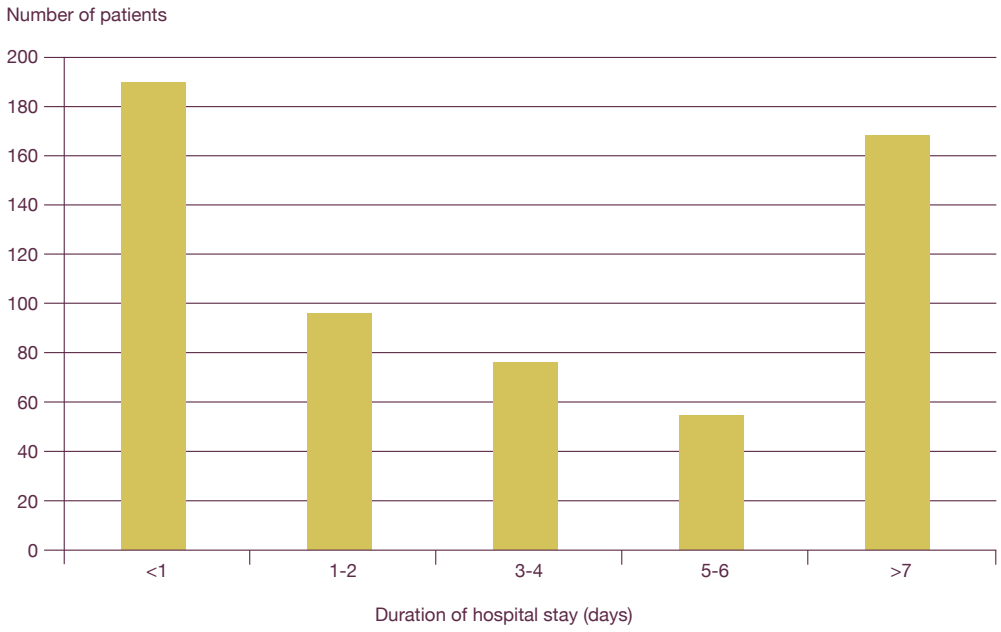

Figure 4.2 Duration of hospital stay prior to cardiac arrest
(n=583, not answered in 2 cases)

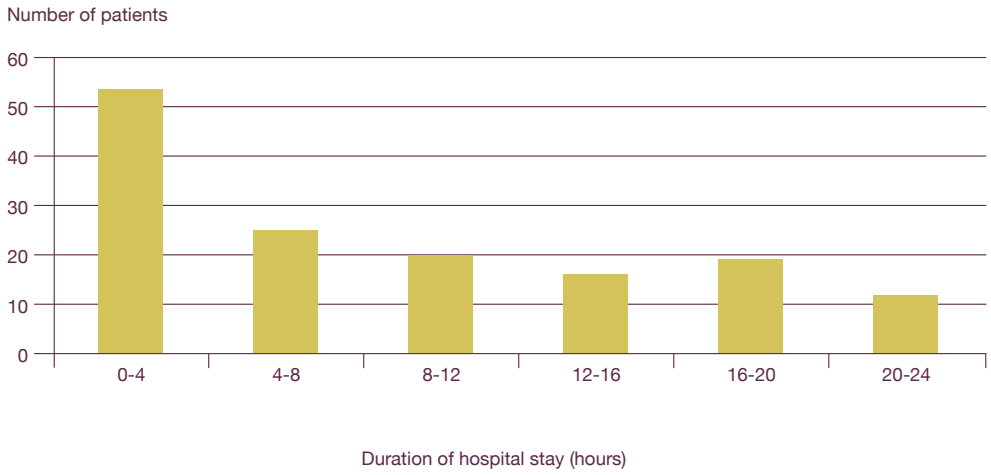

Figure 4.3 Duration of hospital stay in those that stayed less than 24 hours
(n=146, not answered in 43)

Figure 4.3 shows duration of hospital stay prior to cardiac arrest in the group with a length of stay of less than 24 hours. Actual time in hospital prior to cardiac arrest could be calculated in 146 of the 189 patients. Of this group 99 had a stay of less than 12 hours and 47 a stay of longer than 12 hours. This highlights the need to ensure rapid consultant review for acutely unwell patients. The time from admission to death was short in a substantial number and this group of patients should have had access to consultant review.

The clinician caring for the patient at time of cardiac arrest was asked if the patient was on an end of life care pathway. Table 4.3 shows that one percent of the patients in this study (7/578), who underwent CPR, were on an end of life care pathway. It is not clear if the care pathways did not include DNACPR direction or if this was due to lack of documentation or handover of information. However it is difficult to conceive a situation where attempted CPR in the setting of an end of life care pathway can be clinically appropriate or in the best interests of the patient. Although this was a small number of patients in this study this poor practice was a concern.

Table 4.3 Patients were on an end of life care pathway

End of life care pathway	n	%
Yes	7	1.2
No	566	97.9
Unknown	5	<1
Subtotal	**578**	
Not answered	7	
Total	**585**	

Six out of the seven patients had return of circulation and survived the cardiac arrest. However all seven patients died before hospital discharge.

Physiological observations are key to recognition of patient deterioration. The Advisors were asked if there were documented requests for type and frequency of physiological observations in the 48 hours prior to cardiac arrest.

Figure 4.4 shows that the number of patients for whom an explicit instruction about physiological observations could be found in the case notes was low. A clear

physiological monitoring plan is needed to ensure early recognition of deterioration and facilitate appropriate intervention and decision-making. Previous NCEPOD work has highlighted this as an area of weakness[2] and both NCEPOD and NICE[9] have made recommendations that there should be a clearly documented physiological monitoring plan. The deficit in this area was substantial in this sample of patients.

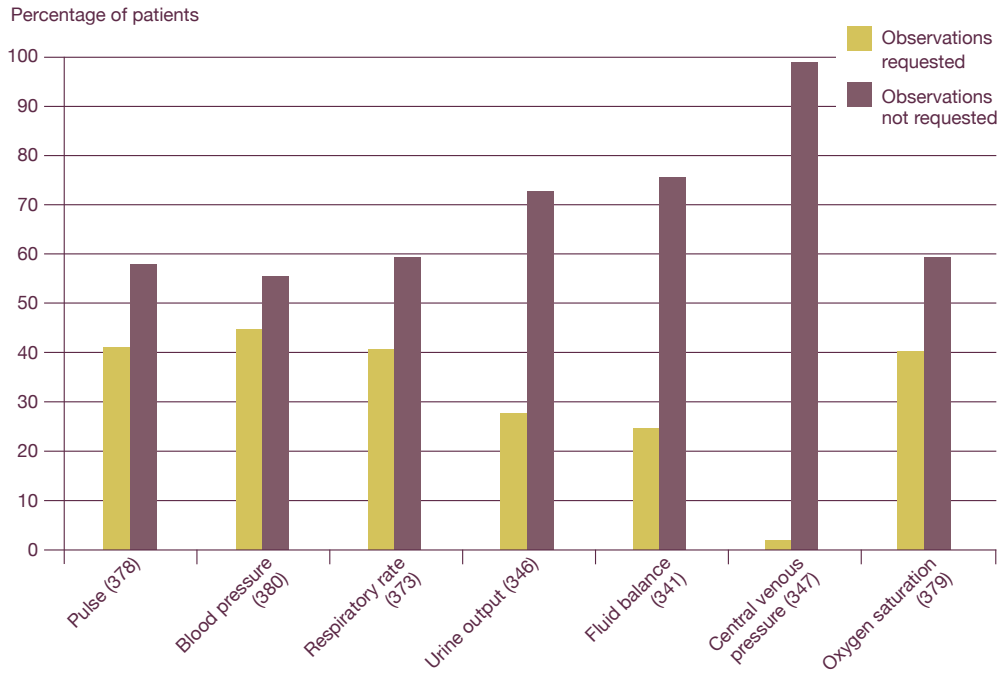

Figure 4.4. Observations that were requested/not requested during the 48 hours prior to cardiac arrest *(the denominator for each domain is shown in brackets)*

Table 4.4 Number of patients by requested frequency of observations

Parameter measured	Hourly	Four hourly	Other	Not specified	Number of patients for whom observations requested
Pulse	33	36	50	39	**158**
Blood pressure	34	36	52	47	**169**
Respiratory rate	34	36	46	36	**152**
Urine	30	16	22	27	**95**
Fluid balance	15	6	30	32	**83**
Central venous pressure	2	0	0	3	**5**
Blood oxygen saturation level (SpO_2)	29	35	47	43	**154**
Other	10	6	16	12	**44**

Table 4.4 provides further details on the physiological monitoring plan in the group of patients where observations had been requested. In most cases no monitoring plan was noted. Where it was noted, it could be seen that in the majority of plans recorded the frequency of observations that had been requested; it must be noted that no frequency was stated in between 20 and 40% of cases (depending on the parameter considered).

A major purpose of a physiological monitoring plan is to ensure that deterioration is recognised and that appropriate escalation of care happens. A key element of the effectiveness of monitoring is clarity on when to escalate care. Advisors were asked to examine the extracts of the medical record available to them and assess if there were instructions to the nursing staff as to when to alert the medical staff in the event of deterioration. Table 4.5 shows the results of this assessment.

Table 4.5 Instructions to nurses about when to alert medical staff that a patient was deteriorating was recorded in the case notes

Instructions recorded	n	%
Yes	85	21.0
No	320	79.0
Subtotal	**405**	
Insufficient data to assess	121	
Total	**526**	

In only 85/405 (21%) cases with enough information for assessment was there evidence of instructions regarding criteria for escalation. These findings highlighted a concern that the system will fail to respond appropriately when patients deteriorate. One possible reason for these apparent deficiencies is that there was organisational system for setting out physiological observations and triggering an appropriate response without the need for this to be written down in each individual set of records.

In the organisational chapter the use of early warning systems and escalation protocols were presented; 99% of hospitals stated that they used an early warning system and in 98% they were linked to escalation protocols (Tables 2.14 and 2.15). The findings from these data should be viewed in this context.

Case study 7

An elderly patient was admitted to hospital due to pain from abdominal distension secondary to ascites. The cause of ascites was known to be metastatic colonic carcinoma and all therapeutic options had been explored. The patient was on an end of life care pathway and understood that they were nearing the end of life. Paracentesis was performed to ease the symptoms of pain and breathlessness. Forty-eight hours after hospital admission the patient had a PEA cardiac arrest. The cardiac arrest team was summoned and CPR started promptly. After 10 minutes of CPR there was a return of circulation and spontaneous respiratory effort, however the patient remained obtunded and unresponsive. After discussion with the consultant in charge it was decided that further investigation or escalation of care was not appropriate. The patient survived for a further 36 hours but never regained consciousness.

It is not clear why CPR was performed in a patient who was on an end of life care pathway and was nearing the end of life. The Advisors considered this very poor practice.

Advisors were asked if the patient was monitored using a system that could be recognised as a 'track and trigger' chart. Table 4.6 shows these findings.

Table 4.6 Track and trigger monitoring system used

Track and trigger used	n	%
Yes	282	78.8
No	76	21.2
Subtotal	**358**	
Insufficient data	168	
Total	**526**	

This could be answered in only 358 cases. In 282 of those cases the Advisors could identify a track and trigger monitoring chart. This does not completely fit with the responses received from hospitals indicating that almost all hospitals used this type of chart. However, it was encouraging that these charts were widely used as their purpose is to recognise warning signs of physiological instability early and ensure an appropriate response.

Table 4.7 shows how patients were assessed against the presence or absence of the criteria that were given to the Advisors to assess each case. These were adapted from medical emergency team calling criteria[29] and have been used previously in NCEPOD work in this area.[2]

There were substantial proportions of patients who met these criteria for significant physiological derangement (or concern). The most prevalent problems were hypoxia, hypotension and tachypnoea. These criteria are considered 'red flags' for patients at risk and in most track and trigger systems would trigger a patient review.[29-31]

Table 4.8 shows that when all markers of physiological instability were considered (from Table 4.7) 322 patients had at least one marker present, 122 patients had no markers present and there was insufficient data to assess this in 82 patients.

In discussions with the Advisor group it was suggested that the criteria used were far from the normal range and that more subtle criteria could be used to assess

Table 4.7 Patient assessments

Criteria reached in 48 hours prior to cardiac arrest	Yes	%	No	%	Subtotal	Insufficient data	Not answered
Respiratory rate <8 /min	**13**	3.7	**343**	96.3	**356**	131	39
Respiratory rate >30/min	**86**	23.6	**279**	76.4	**365**	124	37
Oxygen saturation <90% on oxygen	**159**	42.0	**220**	58.0	**379**	115	32
Difficulty speaking	**49**	16.2	**253**	83.8	**302**	183	41
Pulse <40 beats/min	**23**	6.3	**344**	93.7	**367**	118	41
Pulse >130 beats/min	**69**	18.6	**301**	81.4	**370**	119	37
Systolic BP <90 mm Hg	**141**	37.3	**237**	62.7	**378**	115	33
Repeated seizures	**2**	<1	**386**	99.5	**388**	96	42
Unexplained decreased consciousness	**59**	15.9	**313**	84.1	**372**	114	40
Agitation/delirium	**43**	12.0	**314**	88.0	**357**	121	48
Other concern	**66**	19.0	**282**	81.0	**348**	115	63

Answers may be multiple

Table 4.8 Number of markers of physiological instability

Number of markers recorded	n	%
At least one	322	72.5
None	122	27.5
Subtotal	**444**	
Insufficient data to assess	82	
Total	**526**	

patients at risk. Even with these extreme criteria it appears that there may be opportunities to recognise many of these patients prior to cardiac arrest and to intervene in over 70% of cases.

It also worth noting that over one quarter of patients did not have any of the predefined markers of physiological instability. Whilst it may be that the criteria used were not sufficiently sensitive it is also clear that for some patients a cardiac arrest may have no preceding signs. A good example is a patient with acute coronary syndrome who has a sudden VF arrest with no preceding abnormal physiological markers.

The duration of physiological instability is another key factor. If the duration is long then there appeared to be greater opportunity for intervention. Figure 4.5 shows the duration of physiological instability in all patients who exhibited at least one marker of instability.

Sixty two percent of these patients had physiological instability for longer than six hours, 47% longer than 12 hours and 20% longer than 24 hours. It appears that there was often a substantial time interval between onset of physiological instability and cardiac arrest. This provided potential opportunity to intervene and influence patient outcomes if warning signs had been recognised and acted upon promptly. This intervention may be new treatment to halt deterioration and improve outcome or it may be recognition that new treatments are available or appropriate and that CPR status should be considered.

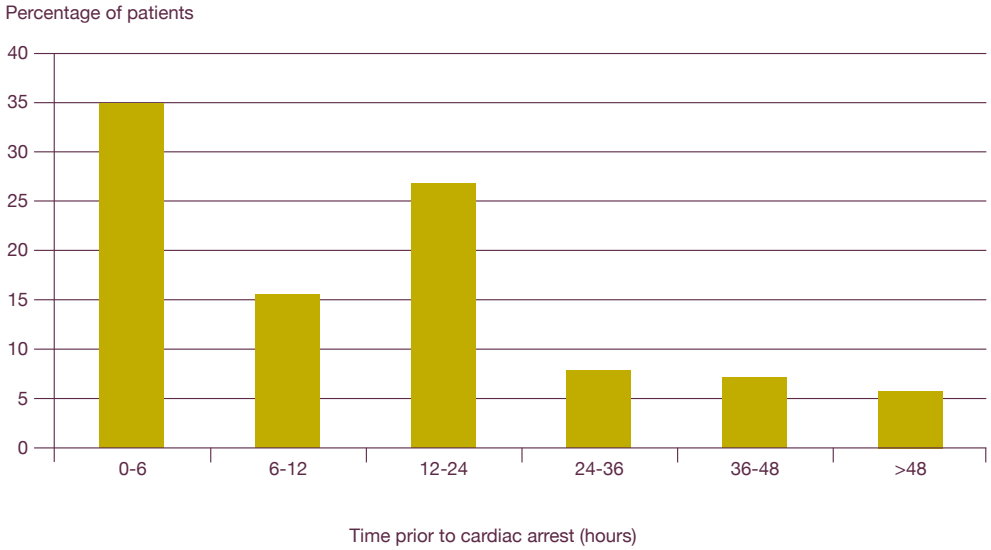

Figure 4.5 First appearance of markers of physiological instability prior to cardiac arrest ***(n=190, not answered in 132)***

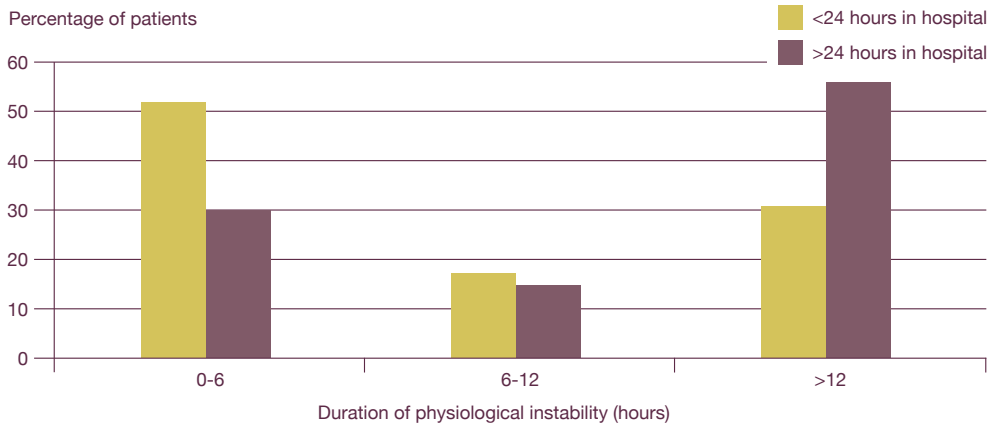

Figure 4.6 Duration of physiological instability for those patients in hospital either less than or longer than 24 hours *(n= 179, not answered in 101)*

Patients who had a shorter interval between admission and cardiac arrest tended to have shorter periods of physiological instability before their arrest. Figure 4.6 show the duration of physiological instability prior to cardiac arrest in those patients who had a cardiac arrest within 24 hours of hospital admission or within a time frame greater than 24 hours post admission.

Case study 8

A elderly patient was admitted to hospital as an emergency because of breathlessness. After initial assessment it was suspected that this was due to community acquired pneumonia. Appropriate treatment was commenced, and confirmed at consultant review, which took place within six hours of admission. At that time the patient was tachypnoeic (respiratory rate 20 breaths per minute), tachycardic (pulse 110 beats per minute, sinus rhythm) and febrile (temperature 38.2ºC). After a further two hours in the medical assessment unit the patient was transferred to an acute medical ward for ongoing inpatient treatment with IV antibiotics, oxygen and IV fluids. Physiological observations were carried out initially on a four hourly basis. Over the next twelve hours these documented a rising respiratory rate (to 32 breaths per minute), rising pulse rate (to 120 beats per minute) and hypotension (systolic blood pressure 80 mmHg). In that time the patient was reviewed twice by an FY2 doctor. Additional IV fluids were prescribed but no further action was taken. The frequency of observations was increased to hourly, due to nursing concerns. Eight hours later an ST1 doctor reviewed the patient at the request of the nursing staff on the ward. Blood pressure was lower (systolic 75 mmHg) and the patient was less rouseable. Further fluid was prescribed and IV antibiotics were changed. There was no request for more senior review or referral to other teams, such as critical care. Four hours later the patient had a PEA cardiac arrest and CPR was unsuccessful. The last recorded observations were: BP 70/35, Pulse 130/min, Respiratory rate 32/min, Saturation – 85% (on 40% oxygen).

This case illustrates the antecedent factors to cardiac arrest and lack of appropriate action in the face of significant abnormalities. The Advisors considered that this cardiac arrest may have been avoided if escalation to more senior doctors and earlier intervention (haemodynamic and respiratory support) had occurred.

Of those patients that had a cardiac arrest within 24 hours of admission, almost half of this group had abnormalities present for longer than six hours and almost a third for longer than 12 hours prior to cardiac arrest.

Almost three quarters of the group who had been in hospital for at least 24 hours prior to cardiac arrest had abnormalities present for longer than six hours and more than 50% had abnormalities for longer than 12 hours prior to cardiac arrest.

In the 526 cases examined by the Advisors, 2368 individual reviews or patient contacts by doctors or nurses were identified in the 48 hour period prior to cardiac arrest. Figure 4.7 shows the number of patients who underwent each number of reviews for patients who were in hospital for less than or longer than 24 hours prior to cardiac arrest.

Lack of details in the case notes did not allow these data to be collected in 135 cases. In the remainder it can be seen that many patients had frequent reviews. Indeed 160 patients had more than five reviews in the 48 hour period prior to cardiac arrest.

It is inevitable that patients who have a shorter length of stay prior to cardiac arrest will tend to have had fewer reviews than those with longer hospital stays prior to arrest. Most patients who had a cardiac arrest within 24 hours of hospital admission had between one and three reviews. However, even within this group 18 patients had more than five reviews prior to their cardiac arrest. In the group who were in hospital for longer than 24 hours prior to cardiac arrest 142 patients had more than five reviews prior to cardiac arrest. What is clear from these findings is that there was a substantial amount of clinician/patient contact in the period leading up to cardiac arrest.

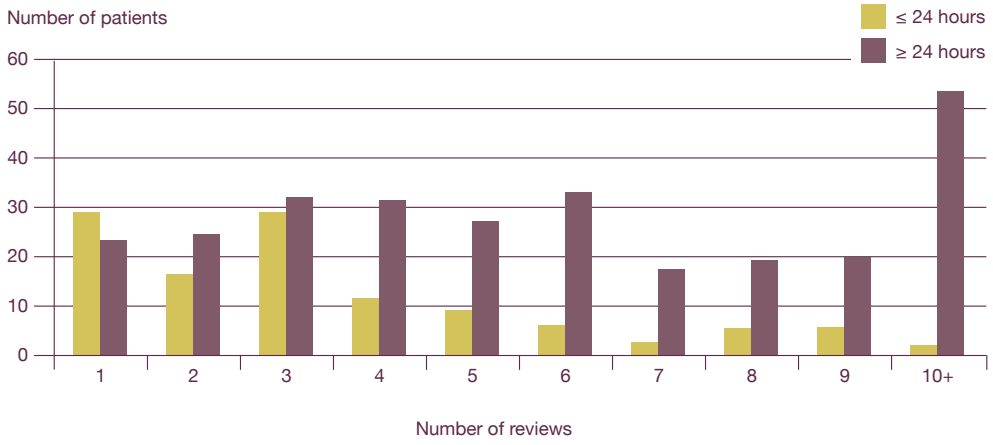

Figure 4.7. Number of reviews in patients in hospital for less than or longer than 24 hours *(n=391, not answered in 135)*

Information on the grade/professional groups who undertook the patient reviews was collected and is shown in Figure 4.8.

Figure 4.8 shows that of the 2368 reviews where grade was available basic grade doctors were responsible for 24% of reviews and registered nurses for 33% of reviews.

Figure 4.9 details the contribution of each grade/ grouping to the individual patient reviews. For example of the 462 patients in column one undergoing the first review in the 48 hours prior to cardiac arrest, consultants were responsible for 13% of these reviews and basic grade doctors for 28%. Of the 151 patients in column seven undergoing the 7th review prior to cardiac arrest consultants were responsible for 8% of these reviews and basic grade doctors for 20%.

An essential part of any 'track and trigger' system is a reliable and escalated response to problems or concerns. These patients who had a cardiac arrest had many reviews but continued to deteriorate and have a cardiac arrest. The findings in Figure 4.9 appear to demonstrate a lack of escalation to senior staff. As the number of reviews increase it might be expected that the proportion of cases seen by more senior staff would increase but this was not the case. In the group of patients who had eight reviews prior to cardiac arrest only 5% of the eighth review were by consultants or senior specialist trainees whilst 57% were by basic grade doctors or nursing staff.

It is remarkable that escalation to more senior doctors did not occur despite abnormal physiological signs and frequent patient contact. More senior involvement may allow treatment or escalation in level of care to be initiated that may stop further deterioration and improve outcome. Alternatively this intervention may allow decisions about CPR status and appropriate levels of care be made prior to cardiac arrest.

In addition to the objective criteria used to assess physiological instability Advisors were asked if in their opinion there were 'warning signs' or markers that the patient was at risk of deterioration and cardiac arrest.

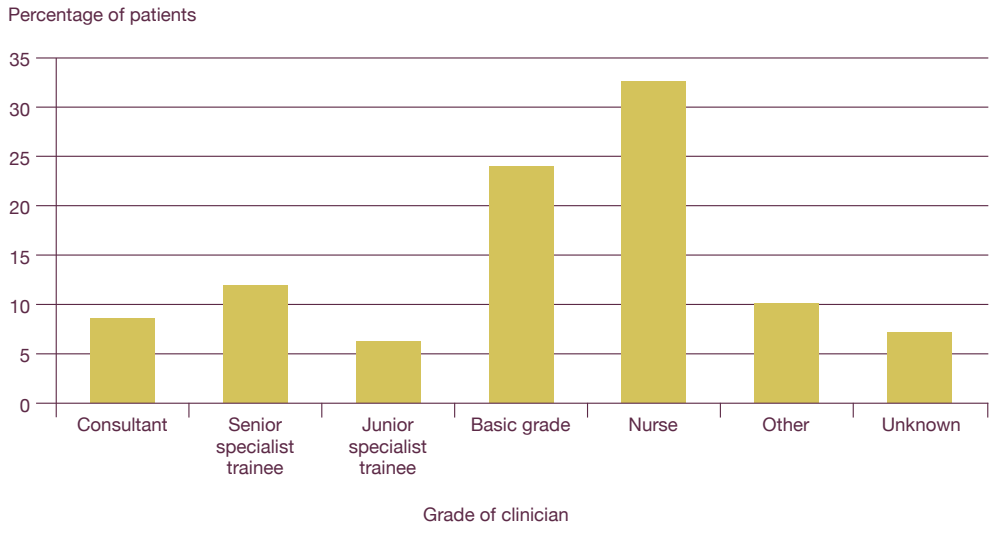

Figure 4.8 Summary of the grade of clinician reviewing patients during the 48 hours prior to cardiac arrest *(n=2368)*

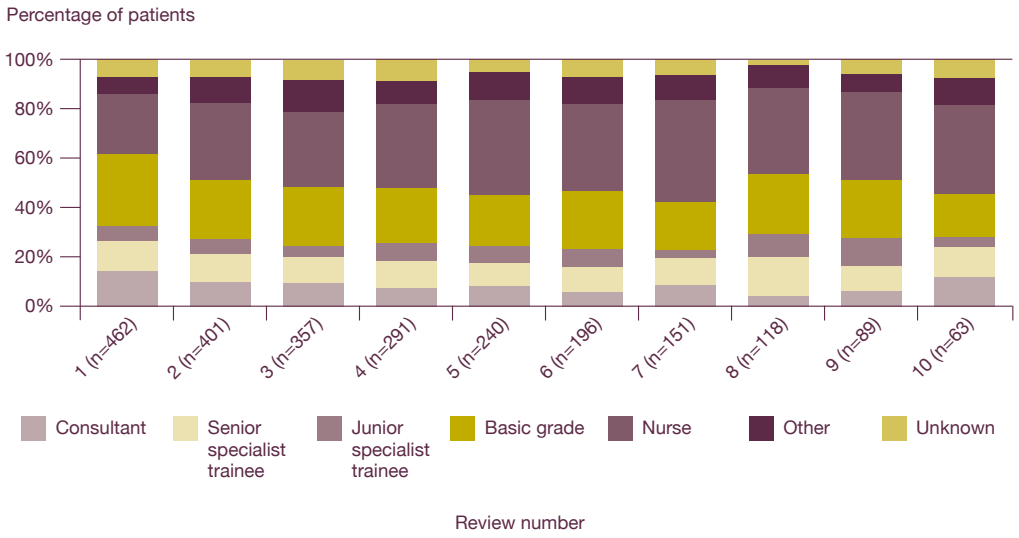

Figure 4.9 Grades of clinician that reviewed patients during 10 reviews in the 48 hours prior to cardiac arrest *(the denominator for each review number is shown in brackets)*

Table 4.9 Warning signs were apparent that the patient was deteriorating - Advisors' opinion

Warning signs were apparent	n	%
Yes	344	74.5
No	118	25.5
Subtotal	**462**	
Insufficient data	64	
Total	**526**	

Table 4.10 Action taken if warning signs were present - Advisors' opinion

The signs were:	Yes	%	No	%
Recognised	152	64.1	85	35.9
Acted on adequately	104	43.9	133	56.1
Communicated to appropriate senior doctors	106	44.7	131	55.3

Answers may be multiple (n/237; not answered in 107)

For 75% of the patients in whom sufficient data were returned, the Advisors stated that there were clear warning signs present (Table 4.9), and gave an opinion of what was done in response to the warning signs that patients were deteriorating (Table 4.10).

In 152/237 of these cases the Advisors believed that the signs were recognised, in only 44% (104/237) of cases did the Advisors feel that adequate action was undertaken and in 45% (106/237) did appropriate communication to more senior doctors happen. These opinions complement the objective data on duration of physiological instability prior to cardiac arrest. Some patients may continue to deteriorate despite recognition and intervention and in that instance it would seem harsh to criticise the time interval between onset of instability and arrest. However it is clear, from Advisor opinion, and the objective data from the clinicians directly involved in the patients' care, that there were problems with recognition, action and senior involvement. The Royal College of Physicians has recently published an acute care toolkit to highlight the constraints and challenges faced and make recommendations to ensure delivery of high quality acute care which should aid this.[32]

Advisors were asked if the cardiac arrest was predictable and avoidable. These data are shown below in Table 4.11 and Table 4.12.

Table 4.11 Cardiac arrest was predictable - Advisors' opinion

Predictable cardiac arrest	n	%
Yes	289	63.7
No	165	36.3
Subtotal	**454**	
Insufficient data to assess	72	
Total	**526**	

Table 4.12 Cardiac arrest was avoidable - Advisors' opinion

Avoidable cardiac arrest	n	%
Yes	156	37.8
No	257	62.2
Subtotal	**413**	
Insufficient data to assess	113	
Total	**526**	

In 64% of cases the Advisors stated that the cardiac arrest was predictable, given the markers of physiological instability and presence of warning signs that the patient was deteriorating. It was a marked finding that for such a high percentage of patients having a cardiac arrest this was the case. Similarly over one third of cardiac arrests and subsequent resuscitation attempts were considered avoidable. The Advisors believed that a DNACPR decision should have been made in 74 cases, and were of the opinion that if earlier recognition and intervention had occurred the patients may not have deteriorated to the point of cardiac arrest in 99 cases.

The Advisors were asked to look at the 48 hours prior to cardiac arrest and provide a grade using a nine point system (1 = very poor and 9 = excellent) for the following aspects: Organisational aspects of care, clinicians' knowledge, appreciation of clinical urgency, supervision of junior staff, seeking of advice from senior doctors.

This assessment was based on the written information available to them. The responses have been grouped into good (7-9), adequate (4-6) and poor (1-3) (Figure 4.10).

The majority of cases in each domain were rated good or adequate but it is the variability and lack of assurance that this level would be delivered that is a patient safety concern. From this grouping it can be seen that Advisors had most concerns about seeking of advice from senior doctors (almost one in three cases rated as poor) and supervision of junior staff (one in four cases rated as poor) although there was a substantial number of cases in the poor category across the remaining domains.

The same grading scale was used to assess the following aspects of clinical care: management of airway, breathing, circulation, oxygen therapy and monitoring. The responses have been grouped into good (7-9), adequate (4-6) and poor (1-3) (Figure 4.11).

The domain with the highest number of cases rated as poor was patient monitoring, where almost one in four were rated as poor.

Lack of adequate patient monitoring and ensuring a rapid and appropriate response is a common theme in these data. It appears that there was a difference between what hospitals think they do (most reported using track and trigger systems), what they actually do (the number of track and trigger systems used in patients in this study) and the effect that that had on recognising and responding to unwell patients. This is a major deficit in patient care.

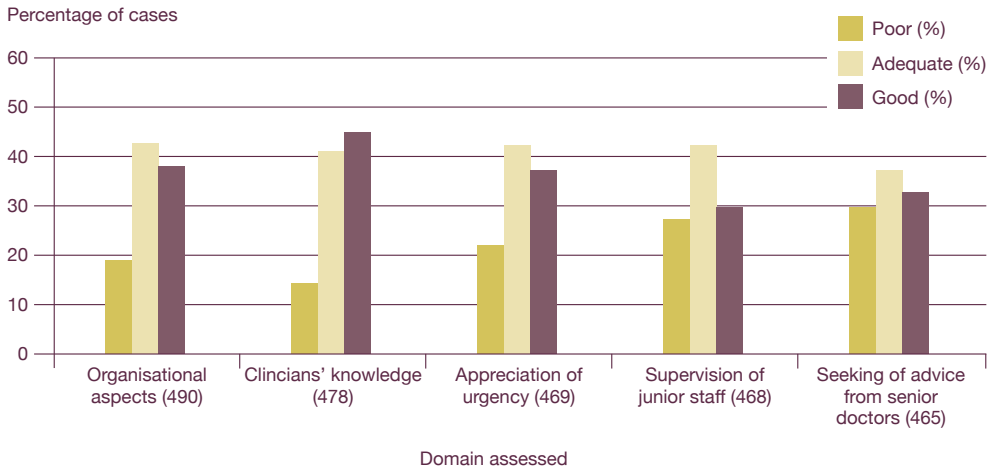

Figure 4.10 Advisor grading of clinical aspects of care in 48 hours prior to cardiac arrest *(the denominator for each domain are shown in brackets)*

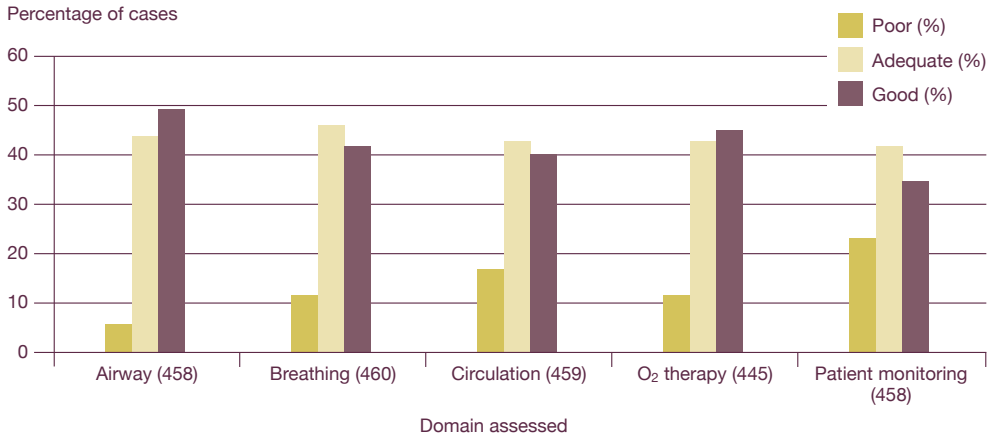

Figure 4.11 Advisors grading of aspects of patient management in the 48 hours prior to cardiac arrest *(the denominator for each domain is shown in brackets).*

Key Findings

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

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.

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5 – Resuscitation status

In the previous chapter we commented on when CPR status had been considered at the 'initial assessment' and then again at the 'first consultant review'.

This chapter covers this topic in more depth, detailing consideration of CPR status and decision making at any point prior to the cardiac arrest.

The clinician caring for the patient at the time of the cardiac arrest was asked if there was a statement in the notes detailing the patients' resuscitation status prior to the cardiac arrest. Table 5.1 shows the results of this question.

Table 5.1 CPR status was recorded in the notes

CPR status was recorded	n	%
Yes	122	22.1
No	430	77.9
Subtotal	**552**	
Not answered	33	
Total	**585**	

If an explicit decision had been documented the clinicians were asked what this decision was. Table 5.2 shows these data.

Table 5.2 Explicit CPR decision had been made

CPR status	n	%
For CPR	70	57.4
DNACPR	52	42.6
Total	**122**	

In 22% (122/552) there was a written statement in the notes making an explicit decision about CPR status (Table 5.1). In 70/122 (57%) the patient was for CPR in the event of a cardiac arrest and in 52/122 (43%) the decision was DNACPR (Table 5.2). This poses two questions:

1. **Why did 52 patients who had a documented DNACPR decision undergo a CPR attempt?**
   Was this due to poor documentation, poor handover, poor communication or poor systems for holding this information? Data were not collected to answer these questions but we consider that it is not appropriate that 52 patients underwent CPR when a decision had been made that this was not appropriate.

2. **Why was no explicit decision made in 430/522 (78%) of patients?**
   Does this reflect the default position is that all patients are for CPR unless stated otherwise and if so is this the correct approach in acutely unwell patients as those sampled for this study? Such an important decision as DNACPR or for CPR in this group should be explicitly documented. Not doing so may lead to inappropriate treatment and confusion within the team caring for the patient. Furthermore the requirement to document a decision will prompt consideration of CPR status and provide a basis for auditing compliance and decision making. Further details are shown in Table 5.4.

Table 5.3 shows the responsible clinicians' reasons for making a DNACPR decision.

Table 5.3 Reason for the DNACPR decision

Reason	n
Patient was unlikely to survive	48
Patient would have a poor quality of life	11
It was at the patient's request	5
Unknown	1

Answers may be multiple (n/52)

The answers to this question could be multiple. However, in all but four cases the absence of medical benefit (unlikely to survive) was the given as a reason. There were also concerns by these clinicians about quality of life but it appeared that these were secondary concerns compared to likelihood of survival.

Where a DNACPR decision had been made the responsible clinician was asked about patient and next of kin involvement. With respect to patient involvement in the decision, the answer was 'yes' in eight cases and 'no' in 22 cases. With respect to next of kin involvement the answer was 'yes' in 25 cases and 'no' in seven cases. In 22/52 cases the treating clinician did not know if there had been patient involvement. Similarly in 20/52 cases the treating clinician did not know if there had been next of kin involvement.

This is a difficult and challenging subject. If a DNACPR decision is made because the patient will not survive CPR, the decision may be communicated to the patient (if appropriate) and/or the next of kin. There is no requirement to engage in discussion as this suggests that CPR would be an option – when it has been decided that it is not an appropriate course of action due to the fact it will not work. Furthermore, it may be considered that it is not in the interests of the patient to discuss the fact that CPR will not be offered. Guidance from the General Medical Council states that this subject should be explored sensitively to understand patients' views but concludes that where it is considered ***'that attempting CPR would not be of overall benefit for the patient, you are not obliged to offer to attempt CPR in the circumstances envisaged'***.[33]

Case study 9

A middle-aged patient with severe ischaemic cardiomyopathy was admitted to hospital due to worsening breathlessness. The patient was admitted to a ward and cared for by the cardiology team who were familiar with the patient's history and treatment. Over the next six days in hospital changes were made to drug treatment to try to optimise cardiovascular function. However the patient remained very breathless and repeat echocardiography showed global severe impairment of left ventricular systolic function (estimated ejection fraction of 10%). The consultant discussed progress with the patient and explained that there were limited options for further treatment but that active therapy would continue in the hope that things may improve. The consultant did not discuss CPR status with the patient but an entry in the medical notes stated 'in the event of a cardiac arrest CPR will not be effective and should not be performed'.

One day later the patient had a cardiac arrest and CPR was initiated and continued for 15 minutes. It was not successful and the patient was certified dead.

This patient had full and active treatment to try to improve cardiovascular function, whilst it was recognised that a poor outcome was likely but not inevitable. A correct decision that CPR would not be effective was made. The Advisors commented that care prior to the cardiac arrest was of a high standard but that the initiation of CPR was poor and an undignified procedure at the end of life.

Case study 10

A middle-aged patient with advanced inoperable pancreatic carcinoma was admitted to hospital. A biliary stent had been inserted two months prior to provide symptomatic relief from bile duct obstruction and jaundice. This admission was due to sepsis, abdominal pain and worsening jaundice. Ultrasound examination showed biliary tree dilatation. Chest x-ray showed consolidation at the right lung base. All treatment options were discussed with the patient who declined further invasive procedures or escalation of care. The patient understood the severity of the situation but was content to be treated with antibiotics, fluids, oxygen and analgesia. Resuscitation status was discussed with the patient by the responsible consultant and it was agreed that CPR would not be initiated and this was documented in the notes.

The patient had a cardiac arrest and CPR was initiated, after 10 minutes of resuscitation spontaneous return of circulation was obtained. The patient was intubated, had poor respiratory effort and remained obtunded. The patient was transferred to the intensive care unit. No consultants were involved in this process. The patient continued to deteriorate and died four hours later.

The Advisors commented that care was appropriate and good, including a DNACPR decision. They questioned why CPR was initiated despite the DNACPR decision and questioned the lack of consultant involvement in decision making after CPR.

In some circumstances DNACPR decisions may involve quality of life considerations. There are circumstances where CPR may work and the patient may survive but concerns exist about the burden of disease and quality of life after CPR. In these circumstances it is very important to enter into sensitive discussions with patients and/or next of kin, to understand their views and to allow an agreed course of action to be followed.

The previous paragraphs highlight key differences in the role of CPR, depending on whether or not it will work, and the way in which patients and next of kin might be engaged.

Irrespective of these differences this work has revealed that involvement of patients (or next of kin where appropriate) in discussions about CPR status was not practiced commonly. This might be due to the fact that CPR would not work and therefore discussion was felt not to be needed. However, the lack of records to answer the question of whether the patient and/or next of kin had been involved raises some questions – lack of good process, lack of documentation or both? The General Medical Council guidance on recording and communicating CPR intentions is very clear about this and states ***'Any discussions with a patient, or with those close to them, about whether to attempt CPR, and any decisions made, should be documented in the patient's record or advance care plan. If a DNACPR decision is made and there has been no discussion with the patient because they indicated a wish to avoid it, or because it was your considered view that discussion with the patient was not appropriate, you should note this in the patient's records'***.[33] It does not appear that practice is following this guidance in this sample of patients.

The treating clinicians were asked the reasons why a DNACPR decision had not been made in the remainder of the patients.

Table 5.4 Reason for no DNACPR decision

Reason	n	%
Patient was for full and active management	326	76.9
No opportunity/time to discuss with relatives	27	6.4
No opportunity/time to document the decision	17	4.0
No opportunity or time to discuss with the patient	16	3.8
The perceived need to discuss resuscitation status with the patient/relatives inhibited the decision being made	8	1.9
Other	31	7.3
Unknown	5	1.3

Answers may be multiple (n/424; not answered in 76)

By far the major reason stated was that the patient was for full and active management (326/424: 77%) (Table 5.4). This is not a reason to avoid the issue of CPR status. Recent work has shown that DNACPR decisions are still interpreted to mean that other care should be withheld and that some doctors believe that DNACPR orders impact on the care that their patients receive.[34]

It appears from that work that many clinicians associated DNACPR with less than active treatment. However, a patient can be treated fully and appropriately for their condition, but if they should have a cardiac arrest then the option of attempting or not attempting CPR exists, just as the decision about what escalation in therapy is appropriate needs to be considered. It is important to agree and document what treatments would be indicated and what would and would not be undertaken. The use of 'ceilings of treatment' documentation may be of benefit. A good example of this kind of documentation can be seen in Appendix 7.

Of the 326 patients considered to be for 'full and active management', only 43 had a documented decision to use CPR in the event of a cardiac arrest. If a firm decision had been made that CPR should be undertaken in 283 patients then this had not been documented.

In addition there were 60 instances where lack of time to either document the decision or discuss the decision with patients or relatives was cited as the reason for making no decision. Whilst it is good practice to discuss or communicate CPR/DNACPR with patients and relatives (where appropriate) the lack of time or opportunity, to do so due to the arrest happening shortly after admission should not inhibit decision making where it is clear that CPR would have no clinical benefit.[33, 35] If the clinical team believes that CPR will not re-start the heart and maintain breathing, it should not be offered or attempted.

If lack of time was a frequent constraint to decision making due to the fact that the clinician did not have enough time to discuss it with the patient then the pattern of working of the clinicians involved may not be appropriate for the roles they are required to undertake. Trusts/hospitals have a responsibility to ensure that their doctors caring for patients in this situation need to be supported, in that time is made available for all clinicians to undertake their duties and balance the competing interests of planned and unplanned work.

Table 5.5 shows the duration of hospital stay prior to cardiac arrest in the patients where lack of time was noted as a factor in decision making about CPR status.

Table 5.5 Duration of hospital stay prior to cardiac arrest

Duration	n
<1 hour	5
1-2 hours	2
1-6 hours	1
6-12 hours	2
12-24 hours	10
1-2 days	7
2-3 days	3
3-4 days	2
4-5 days	1
7-8 days	1
10-11days	1
>14 days	3
Subotal	**38**
Not answered/data missing	22
Total	**60**

Only a minority of patients in this group had a cardiac arrest within 12 hours of hospital admission and that most were in hospital for one or more days. Lack of time appears to be a poor reason not to have made decisions about CPR status in this group.

As part of the peer review process the Advisors were asked if there was evidence of CPR status being recorded at any point from admission to cardiac arrest.

Table 5.6 CPR status recorded at any point from admission to cardiac arrest - Advisors' opinion

Record made	n	%
Yes	62	12.3
No	443	87.7
Subtotal	**505**	
Insufficient data to assess	21	
Total	**526**	

Advisors found documentation of CPR status in 62/505 cases (12%). Table 5.7 provides details of this decision. As can be seen in 24 patients the decision was DNACPR whilst in 38 the decision was to perform CPR in the event of a cardiac arrest. Again it is worth emphasising that performing CPR in patients with documented DNACPR decisions is poor practice.

Table 5.7 Recorded decision stated that the patient was for resuscitation - Advisors' opinion

Recorded decision	n
Yes	38
No	24
Total	**62**

Where an explicit decision had been made and documented regarding CPR status the Advisors looked for the grade of staff involved. Table 5.8 shows the grade of staff who made the decision about CPR status.

Table 5.8 Grade of clinician who made the CPR status decision - Advisors' opinion

Grade of clinician	n
Consultant	23
Staff grade	2
Trainee with CCT	0
Senior specialist trainee	5
Junior specialist trainee	6
Basic grade	5
Specialist nurse practitioner	0
Other registered nurse	0
Resuscitation officer	0
Other	2
Subtotal	**43**
Insufficient data	19
Total	**62**

Consultants were noted to have made the decision in 23/43 cases. However, basic grades or junior specialist trainees were noted to have made the decision in 11/43 cases. This is not in keeping with good practice or professional recommendations.

Advisors were asked if there was evidence of discussion of CPR status with the patient or next of kin. Tables 5.9 and 5.10 show these data.

Table 5.9 CPR status was discussed with the patient - Advisors' opinion

Discussed with patient	n
Yes	11
No	29
Subtotal	**40**
Insufficient data to assess	22
Total	**62**

Table 5.10 CPR status was discussed with the patient's relatives - Advisors' opinion

Discussed with relatives	n
Yes	22
No	16
Subtotal	**38**
Insufficient data to assess	24
Total	**62**

There was a greater involvement of next of kin rather than patients in decision making about CPR status. However, in both responses patient and next of kin the involvement was low (11/40 patients and 22/38 next of kin).

Discussions of decisions about CPR status are an essential part of good end of life care, where patients are not likely to benefit from CPR or the application of CPR may not be in their best interests. The following quote is from the Department of Health's End of Life Care Strategy.[36]

"During the development of the end of life strategy many people have identified the lack of open discussion between health care staff and those approaching the end of life, as one of the key barriers to the delivery of good end of life care. This represents a major challenge. It requires a significant culture shift both amongst the public and within the NHS. Clinicians and managers need to accept that death does not always represent a failure of healthcare and that enabling people to die as well as possible is one of the core functions of the NHS."

Table 5.11 shows the grade of staff involved in the 11 cases where CPR status was discussed with patients.

Table 5.11 Grade of clinician involved where CPR status was discussed with patients

Grade of clinician	n
Consultant	3
Staff grade	0
Trainee with CCT	0
Senior specialist trainee	1
Junior specialist trainee	2
Basic grade	2
Specialist nurse practitioner	0
Other registered nurse	0
Resuscitation officer	0
Other	0
Subtotal	**8**
Insufficient data to assess	3
Total	**11**

The numbers are small and there are some missing data. However only three cases were discussed by consultants whilst four cases were discussed by basic grade or junior trainee doctors. Again this does not appear to fit with good practice. Similarly in the 22 cases discussed with relatives only three were by consultants and six by basic grade or junior trainee doctors (data not shown).

Case study 11

An elderly patient with severe dementia was transferred from a nursing home to an acute hospital bed due to an acute confusional state. Over the previous few months the patient had experienced significant weight loss. It was noted that food intake was very poor even with help and encouragement. It was felt that the reason for the patient's confusional state may be infection, either chest or urinary tract, and antibiotics were started to cover both possibilities. Over the next few days the patient remained very confused. Due to concerns over poor oral intake a nasogastric tube was inserted. However this was pulled out several times and no effective nutrition was delivered. Six days after admission the patient was noted to be more obtunded, had a high respiratory rate (30 breaths per minute) and urine output was very poor. The patient was reviewed by a CT1 doctor who prescribed further fluids and changed the antibiotics. Concern was expressed in the notes by nursing staff that the patient was dying and that there should be clarity about what to do in the event of a cardiac arrest. The patient was reviewed a further two times by junior medical staff over the next 24 hours. CPR status was not considered during those reviews. Shortly after the last review the patient had a cardiac arrest. When the cardiac arrest team arrived they found the patient to be in asystole. CPR continued for 10 minutes before a decision was taken by a Specialist Registrar in medicine that this was futile and the CPR attempt stopped. There was no return of circulation.

The Advisors considered that this was an undignified procedure at the end of life. Furthermore they thought that it should have been recognised that the patient was deteriorating despite active therapy and that death was a likely outcome. CPR in the context of this case was felt to be inappropriate.

Advisors were asked whether a DNACPR decision should have been made prior to cardiac arrest. They were asked to base this opinion on information gathered about past history, functional status, acute illness, course of illness and likelihood of survival. Advisors felt able to form an opinion in only 230 cases and it was believed that a DNACPR decision should have been made in 196/230 cases and that CPR should have been attempted in only 34/230 cases. Clearly in the vast majority of these cases the Advisors felt that CPR was not indicated.

Table 5.12 Advisors' opinion whether the patient should have had a DNACPR and whether they did or not

Advisors' opinion: Patient should have had a DNACPR decision	Patient had DNACPR		
	Yes	No	**Subtotal**
Yes	22	174	**196**
No	30	4	**34**
Subtotal	**52**	**178**	**230**

Insufficient data/not answered in 296

Table 5.12 shows the Advisors' opinion related to the DNACPR decision. In the 178 cases where the treating clinician had not made a DNACPR decision the Advisors stated that in 174 cases this should have been made. However, in the 52 cases where the treating clinician had made a DNACPR decision the Advisors disagreed in 30 cases.

The Advisors reviewed cases where a DNACPR decision had been made to consider documentation of communication. There was sufficient information in 23 cases to assess this. In 11 cases it was agreed that there was an effective system for recording this information and in five cases this was felt not to be so. In six cases it was felt that communication with the patient was effective and in eight cases this was not present. In 10 cases it was stated that communication with the next of kin was effective and in five cases this was not so.

Key Findings

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.

Recommendations

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.

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6 – Resuscitation attempt

This section of the report covers the period of time immediately surrounding the cardiac arrest and CPR attempt. Data were sourced from the clinician questionnaires, Advisor assessment forms and resuscitation questionnaires. The latter were completed mainly by the person responsible for leading the resuscitation team. The number of resuscitation forms returned was higher than the number of clinician questionnaires and therefore for some analyses the denominator is different.

Table 6.1 Location of cardiac arrest

Location	n	%
Surgical ward	217	27.8
Medical ward	212	27.1
Coronary care unit	94	12.0
Emergency department	63	8.1
Procedure/intervention area	54	6.9
Operating room/post-operative anaesthetic care unit	13	1.7
Outpatient area	10	1.3
Level 2 care	9	1.2
Other	109	14.0
Subtotal	**781**	
Not answered	6	
Total	**787**	

Table 6.1 provides more detail on the location of cardiac arrest than that presented earlier (taken from the clinician questionnaire). The most common locations were still medical and surgical wards (54% of cardiac arrests occurred in these two locations). It is notable that almost one in three cardiac arrests occurred in areas that would be considered higher level care with more monitoring and higher nurse to patient ratios (operating room, coronary care unit, emergency department, intervention area, Level 2 care).

Table 6.2 Time of cardiac arrest

Time	n	%
00:00-07:59	285	36.7
08:00-17:59	318	41.0
18:00-23:59	173	22.3
Subtotal	**776**	
Not answered	11	
Total	**787**	

Table 6.2 shows the time of the cardiac arrest. 318/776 (41%) cardiac arrests occurred in normal working hours. It is known that out of hours staffing generally involves fewer available doctors in training, who are also dealing with a demanding workload, and less direct input of consultant staff. This may have a direct bearing on availability of resuscitation teams and consultant input into decision making regarding the cardiac arrest. As 60% of cardiac arrests happened out of hours this is a potential consideration.

Table 6.3 shows the grade of the team leader on the resuscitation team for each cardiac arrest call. Consultant leadership was low (67/754: 9%). Perhaps this is what most clinicians working in hospital would expect given their knowledge of how resuscitation teams are constituted but such low consultant involvement in an acute life threatening situation could be questioned.

In 148/754 (20%) cardiac arrests the team leader was a basic grade or junior specialist trainee. Consideration of the composition and leadership of resuscitation teams needs to take place.

Table 6.3 Team leader at the resuscitation attempt

Team leader	n	%
Consultant	67	8.9
Staff grade/associate specialist	74	9.8
Trainee with CCT	2	<1
Senior specialist trainee	431	57.2
Junior specialist trainee	102	13.5
Basic grade	46	6.1
Specialist nurse practitioner	10	1.3
Other registered nurse	13	1.7
Resuscitation officer	4	<1
Other	5	<1
Subtotal	**754**	
Not answered	33	
Total	**787**	

Figure 6.1 details the Advanced Life Support (ALS) training status of the team leader and other member of the resuscitation team, as reported on the resuscitation questionnaire.

Of particular note was that almost all team leaders were reported as having ALS training.

Table 6.4 Cause of cardiac arrest

Cause	n	%
Primary cardiac disease	235	39.8
Non-cardiac disease	356	60.2
Subtotal	**591**	
Unknown	196	
Total	**787**	

The clinician returning the resuscitation questionnaire was asked to classify the cause of the cardiac arrest into primary cardiac disease (myocardial ischaemia, primary arrhythmia) or non-cardiac disease (e.g. pneumonia). This was answered in 591 cases and in 235 of those (40%) it was thought that the cardiac arrest was due to primary cardiac disease (Table 6.4).

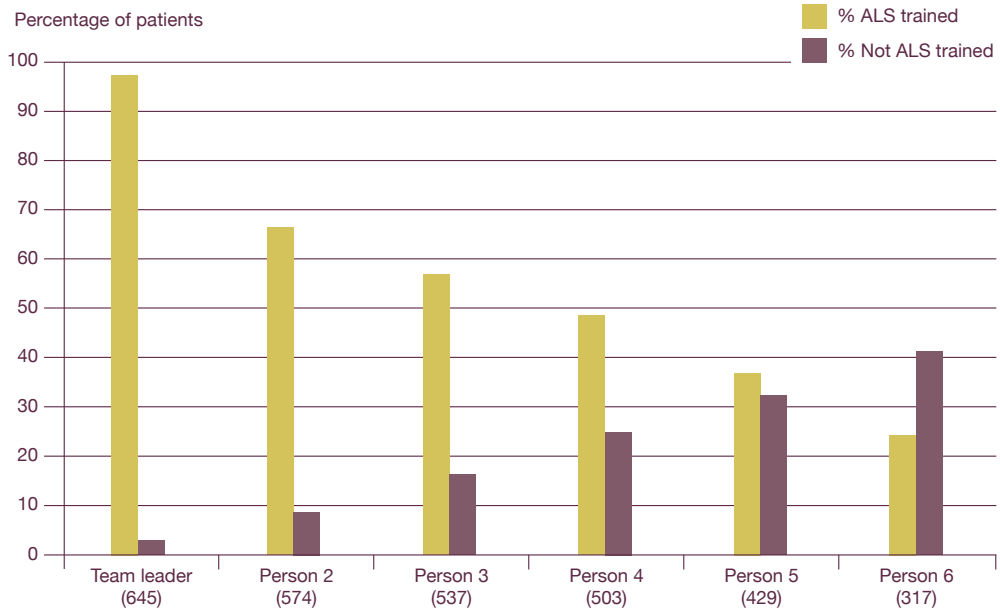

Figure 6.1 ALS training of the resuscitation team *(the denominator for each team member is shown in brackets)*

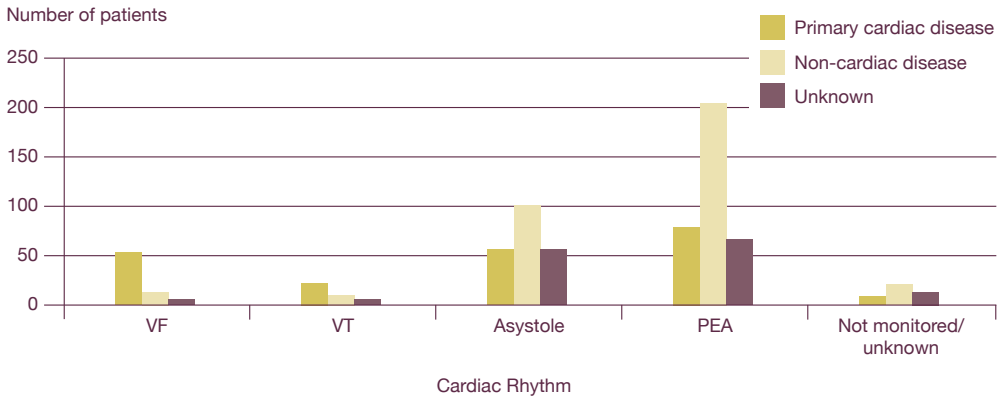

Figure 6.2 Underlying cause and initial primary rhythm of cardiac arrest
(n=730; not answered in 57)

Table 6.5 Primary rhythm at cardiac arrest

Primary rhythm	n	%
Ventricular fibrillation	79	11.1
Ventricular tachycardia	31	4.4
Asystole	227	31.9
Pulseless electrical activity	375	52.7
Subtotal	**712**	
Not monitored/unknown/not answered	75	
Total	**787**	

The primary rhythm is presented in Table 6.5. A minority of patients had VF/VT as the primary rhythm, almost one third asystole and half the patients PEA. It is known that the primary rhythm has an important association with outcome.

Figure 6.2 shows primary rhythm by cardiac/non-cardiac disease. Most of the VF/VT cases were patients who had a cardiac arrest secondary to primary cardiac disease.

Table 6.6 shows if the cardiac arrest was witnessed and/or monitored. In 480/714 cases where this question was answered, the cardiac arrest was witnessed (67%). In 307/714 cases where this question was answered, the cardiac arrest was monitored (43%). In 660 cases an answer was provided to both questions – in this group 251 cases were both monitored and witnessed (38%) and 200 cases were neither monitored nor witnessed (30%).

Table 6.6 Witnessed and /or monitored cardiac arrest

	Monitored				
Witnessed	**Yes**	**No**	**Subtotal**	**Not answered**	**Total**
Yes	251	184	**435**	45	**480**
No	25	200	**225**	9	**234**
Subtotal	**276**	**384**	**660**	**54**	**714**
Not answered	31	23	**54**	19	**73**
Total	**307**	**407**	**714**	**73**	**787**

Table 6.7 Arrest was witnessed assessed against patient outcome

Witnessed	Patient survived to discharge					
	Yes	No	Subtotal	Not applicable	Not answered	Total
Yes	69	261	**330**	2	7	**339**
No	11	165	**176**	0	2	**178**
Subtotal	**80**	**426**	**506**	**2**	**9**	**517**
Not answered	5	41	**46**	0	1	**47**
Total	**85**	**467**	**552**	**2**	**10**	**564**

Table 6.8 Arrest was monitored assessed against patient outcome

Monitored	Patient survived to discharge					
	Yes	No	Subtotal	Not applicable	Not answered	Total
Yes	57	144	**201**	1	5	**207**
No	22	283	**305**	1	4	**310**
Subtotal	**79**	**427**	**506**	**2**	**9**	**517**
Not answered	6	40	**46**	0	1	**47**
Total	**85**	**647**	**552**	**2**	**10**	**564**

Table 6.7 shows survival data broken down by whether or not the cardiac arrest was witnessed. Survival to hospital discharge was greater in cases where the cardiac arrest was witnessed.

Table 6.8 shows survival data broken down by whether the cardiac arrest was monitored. Survival to hospital discharge was greater in cases where the cardiac arrest was monitored.

These figures are based on only 564 patients from whom all the required data were available. Overall rates of survival to hospital discharge rates were much lower and are presented in the next chapter.

However, there appeared to be an association between survival to hospital discharge and witnessing/monitoring of the patient at time of cardiac arrest. This may be related to speed of recognition but could equally be related to other factors. Patients most likely to benefit from CPR may be more likely to be cared for in areas where staffing and facilities allow direct observation and monitoring.

Of the 110 VT/VF cases in Figure 6.2, 84 were witnessed cardiac arrests.

Table 6.9 shows competence and action of the witness to the cardiac arrest in cases where the primary rhythm was a shockable one (VF/VT).

Table 6.9 When witnessed, the witness was competent to defibrillate

Witness was competent to defibrillate	Total
Yes, and they did	58
Yes, but they did not	8
No	8
Subtotal	**74**
Not applicable (defibrillation was inappropriate)	10
Total	**84**

In 66/74 cases the witness was competent to defibrillate and in most of the instances (58/66) the witness did defibrillate the patient. As time to defibrillation is a key intervention to improve outcome these data are reassuring. However, in almost one in eight cases the witness was not competent to defibrillate leading to delay in providing appropriate treatment.

Table 6.10 shows the time interval from recognition of cardiac arrest to defibrillation. It should be noted that this question was not answered in 34/110 cases (31%) and this possibly reflects the difficulty of collecting accurate data in the emergency situation of a cardiac arrest. Where data were provided the majority of patients received defibrillation very quickly. However almost one in five had a delay of longer than three minutes prior to defibrillation. The cases where long delays were noted were few but were of concern.

Table 6.11 shows time from recognition of cardiac arrest to initiation of resuscitation attempt.

Table 6.11 Time from cardiac arrest to the resuscitation attempt

Time	n	%
Immediately	287	59.1
1-3 minutes	178	36.6
4-6 minutes	12	2.5
7-8 minutes	1	<1
9-10 minutes	2	<1
11-15 minutes	2	<1
16-25 minutes	3	<1
>25 minutes	1	
Subtotal	**486**	
Not answered	301	
Total	**787**	

Table 6.10 Time to defibrillate and whether the arrest was witnessed

Time	Witnessed				
	Yes	No	Subtotal	Not answered	Total
Immediately	6	0	**6**	0	**6**
1-3 minutes	44	7	**51**	5	**56**
4-6 minutes	4	2	**6**	1	**7**
7-8 minutes	1	0	**1**	0	**1**
9-10 minutes	1	1	**2**	0	**2**
11-15 minutes	2	0	**2**	0	**2**
16-25 minutes	2	0	**2**	0	**2**
Subtotal	**60**	**10**	**70**	**6**	**76**
Not answered	24	6	**30**	4	**34**
Total	**84**	**16**	**100**	**10**	**110**

The vast majority of patients had immediate or very quick treatment. Whilst the numbers are small it is difficult to understand why initiation of resuscitation attempt was delayed in the remainder. This is self reported data from the resuscitation questionnaire and details of delays were not requested. All health care staff should be capable of providing basic life support and delays in initiation of basic life support should not occur.

Duration of CPR

Figure 6.3 shows the duration of CPR attempt, as reported on the resuscitation questionnaire. No detail of the duration of CPR attempt was provided in 149/787 cases. Figure 6.3 provides more detail on the duration of CPR.

There was a high proportion of relatively short CPR attempts; 22% of CPR attempts lasted five minutes or less and 43% lasted for 10 minutes or less.

Figure 6.4 shows duration of CPR attempt in cardiac and non-cardiac causes of cardiac arrest (n=481).

The totals are lower than those in Figure 6.3 as the cause of cardiac arrest was not stated in some cases. There are some differences in duration of CPR between arrests with cardiac and non-cardiac causes. Thirty-two percent of CPR attempts where primary cardiac disease was the cause of cardiac arrest lasted for five minutes or less. The corresponding figure for cardiac arrests due to non-cardiac disease was 19%. Furthermore almost half of cardiac arrests due to primary cardiac disease had CPR for 10 minutes or less.

Table 6.12 shows what interventions the patients received during the CPR attempt.

Table 6.12 Interventions applied during CPR

Interventions	n	%
Chest compressions	726	94.3
Assisted ventilation	586	76.1
Adrenaline	579	75.2
Tracheal intubation	310	40.3
Defibrillation	179	23.2
Supraglottic airway device	99	12.9

Answers may be multiple (n/770; not answered in 17)

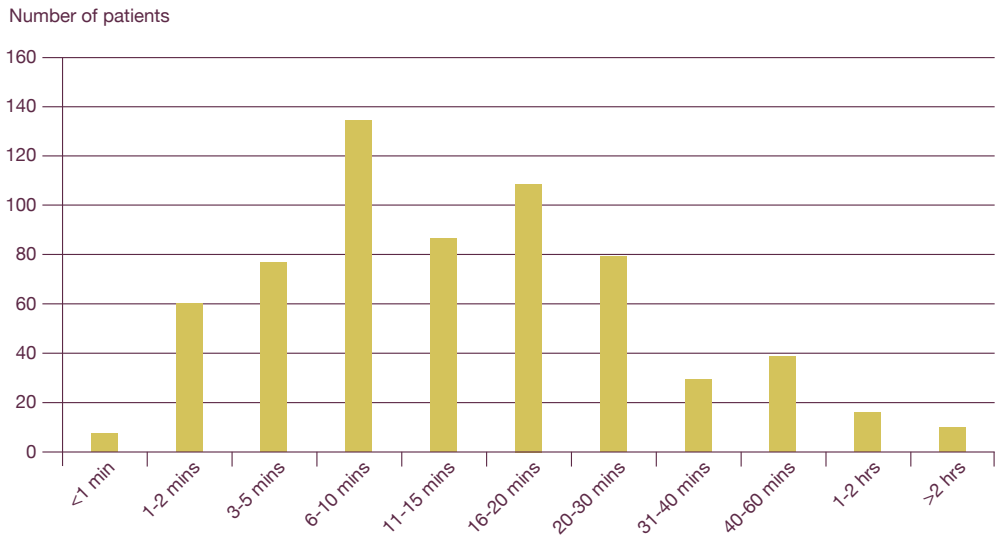

Figure 6.3 Duration of CPR attempt *(n=638; not answered in 149)*

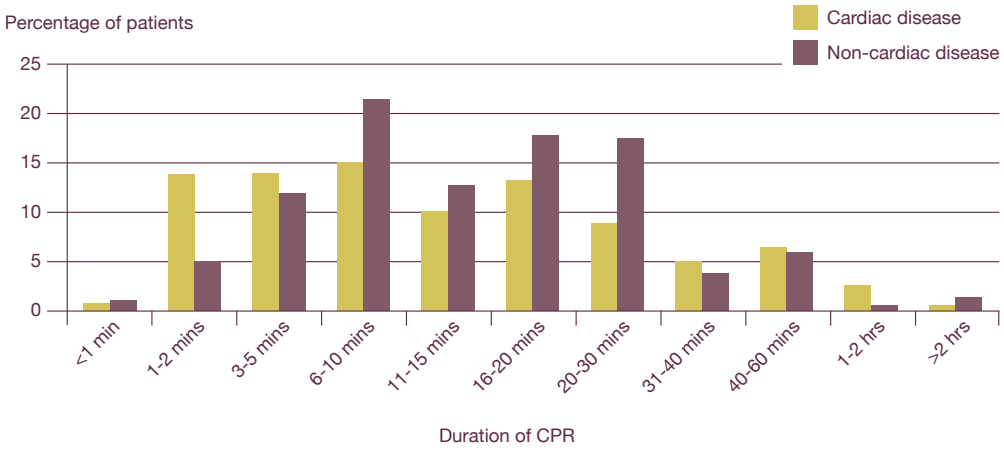

Figure 6.4 Duration of CPR by cardiac and non-cardiac disease *(n=481; not answered in 206)*

Almost all patients received chest compressions but only three quarters received assisted ventilation or adrenaline. Of the patients who received assisted ventilation, 310/586 had tracheal intubation (53%) and 99 had use of a supraglottic airway device (99/586:17%).

Patients requiring resuscitation often have an obstructed airway. In these cases, prompt assessment, with control of the airway and ventilation of the lungs, is essential. Without adequate oxygenation it may be impossible to restore a spontaneous cardiac output. Although for a witnessed cardiac arrest in the vicinity of a defibrillator, attempted defibrillation takes precedence over opening of the airway. That said, in this study many patients who were ventilated were managed with bag and mask ventilation only; 20 patients apparently received CPR for over 30 minutes without tracheal intubation or supraglottic airway device. This may be less than ideal practice when one considers the availability of alternative devices and techniques that can provide a more patent airway and reduce gastric distension.

It is intuitive that the management of the airway during cardiac arrest will be influenced by the duration of CPR and Figure 6.5 details the management of the airway by duration of cardiac arrest.

Figure 6.5 shows the airway technique for each time-band of CPR duration. The percentages refer to percentage of patients in each time-band.

The tracheal tube has generally been considered the optimal method of managing the airway during cardiac arrest. But there is evidence that, without adequate training and experience, the incidence of complications, such as unrecognised oesophageal intubation (6-17% in several studies involving paramedics) is unacceptably high.[37]

Prolonged attempts at tracheal intubation are harmful; the cessation of chest compressions during this time will compromise coronary and cerebral perfusion. Several other airway devices (supraglottic airway devices) may be used for airway management during CPR.

The supraglottic airway devices are easier to insert than a tracheal tube and, unlike tracheal intubation, can generally be inserted without interrupting chest compressions.[38] There were no data collected in this study which supported the routine use of any specific approach to airway management during cardiac arrest.

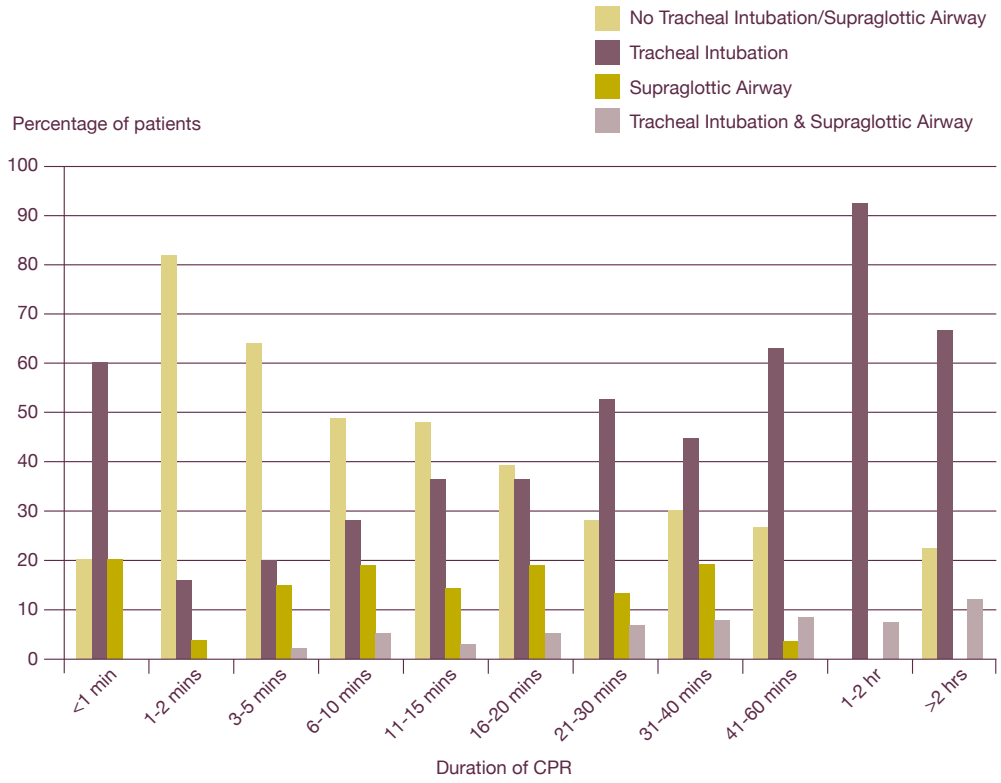

Figure 6.5 Duration of CPR and treatment received *(n=634; not answered in 153)*

Table 6.13 shows whether an anaesthetist or intensivist was part of the resuscitation team.

Table 6.13 Presence of and anaesthetist/ intenstivist on the resuscitation team

Anaesthetist/Intensivist on team	Total	%
Yes	486	76.7
No	148	23.3
Subtotal	**634**	
Not answered	153	
Total	**787**	

Data were provided on the resuscitation questionnaire in 634 cases. In 486 cases (77%) an anaesthetist or intensivist was part of the resuscitation team. Where an anaesthetist or intensivist is not part of the team there may be concerns about airway management. This may depend on the skills and abilities of other members of the team and this may be influenced by the location of the cardiac arrest.

Table 6.14 shows the location for those cardiac arrests where an anaesthetist or intensivist was not part of the team.

Table 6.14 Location of arrest

Location	Total	%
Medical ward	48	32.7
Surgical ward	33	22.4
Coronary care unit	25	17.0
Procedure/intervention area	12	8.2
Emergency department	9	6.1
Outpatient area	1	<1
Other	19	12.9
Subtotal	**147**	
Not answered	1	
Total	**148**	

Half of cardiac arrests without the presence of an anaesthetist or intensivist were on medical and surgical wards. This is 48/212 (23%) of cardiac arrests occurring on a medical ward and 33/217 (15%) of cardiac arrests occurring on a surgical ward. This raises the concern that provision of airway management may be sub-optimal in a substantial number of cases. Hospitals must address this issue and ensure that airway management during CPR is appropriate.

Managing patients who have had a cardiac arrest is demanding and stressful. It relies on a combination of training, knowledge, availability of staff and equipment and team working. Table 6.15 shows data on problems reported by the lead during the CPR attempt.

Table 6.15 Problems reported by the team leader

Problems reported	n	Subtotal	%
Equipment	51	**750**	6.8
Airway management	40	**728**	5.5
Communication/teamwork	29	**728**	4.0
Staff availability	23	**741**	3.1
Drugs	22	**747**	2.9
Defibrillation	6	**698**	<1
Other	63	**65**	
All of the above	1		

Answers may be multiple

The domains with the most frequently reported problems were equipment, airway management and communication/ team work. Overall there were 234 individual problems reported. Whilst multiple problems could be reported in individual cases this high level of problems highlights the complex and time-critical nature of CPR but it also points to the scope for improvement that exists.

Advisors were asked to provide an opinion as to whether problems were evident during the CPR attempt.

Table 6.16 Problems evident during the CPR attempt - Advisors' opinion

Problems with:	n
Airway management	36
Appropriate staff	27
Equipment	21
Drugs	18
Other	16
Defibrillation	5
Speed of response of team	4
Communication & teamwork	2

Answers may be multiple (n/91)

Case study 12

A middle-aged patient was admitted to hospital with a presumptive diagnosis of Pneumocystis carnii pneumonia. The patient was started promptly on appropriate therapy and admitted to a ward a few hours later. The patient deteriorated rapidly and there was inadequate recognition or escalation. No further medical review took place until the patient had a cardiac arrest 36 hours later.

During CPR attempts the patient regurgitated, and gastric contents were noted in the mask that was being used to provide ventilation. The suction unit was not working and this took some time to resolve. The resuscitation team did not include anyone who could intubate the patient at that time so bag and mask ventilation continued. An anaesthetist arrived 10 minutes later and secured the airway with a tracheal tube. Return of circulation was obtained after 25 minutes of CPR and the patient was transferred to the intensive care unit. The patient did not recover and died in the intensive care unit seven days later.

The Advisors considered that this case highlights three main issues:

1. *Lack of recognition or intervention in response to evidence of acute deterioration*
2. *Lack of functional equipment*
3. *Delay in obtaining rapid and definitive airway protection.*

These findings of problems related to CPR attempts support work by the NPSA published in 2007.[14]

Because the number of cases where resuscitation questionnaires were returned was greater than the number of clinician questionnaires or notes, the denominator for this response is lower (526 cases). However there were 91 individual problems identified by the Advisors giving a crude rate of problems of 91/526 (17%). The most frequent problems were airway management (36/526; 7%), presence of appropriate staff and equipment problems. Communication and teamwork were highlighted infrequently as problems by the Advisors, this may reflect the difficulty in assessing this domain retrospectively from the case notes. Airway management and equipment were highlighted both by clinicians returning the resuscitation form and Advisors and attention should be focused on both these areas. It is worth noting again in the context of airway management concerns that only 53% of patients undergoing CPR had either a tracheal tube or supraglottic airway. Many patients did not have advance airway management and this is something that requires further study and possibly better education.

Advisors were asked if problems in the resuscitation process could have affected outcome and in 5/67 cases this was considered to be likely.

Cardiac arrest leading to CPR attempt may often be considered to be a critical incident. Even if the conduct of the CPR event is problem free, the very nature of cardiac arrest merits reporting and recording through a critical incident reporting system. Table 6.17 shows that in only 57 cases (9%) was this the case.

Table 6.17 Critical incident reported

Critical incident	n	%
Yes	57	8.7
No	596	91.3
Subtotal	**653**	
Unknown/not answered	134	
Total	**787**	

Other systems for recording cardiac arrest and CPR attempts may exist but the use of an organisation's critical incident reporting system is more likely to allow better data collection of the incidence of event and reporting through the clinical governance structure.

Whilst the use of critical incident reporting systems will provide data on the incidence of cardiac arrest it will not provide more detailed information on the circumstances, conduct and outcomes of cardiac arrest. Each trust/ hospital should collect structured information on patients who have a cardiac arrest. The National Cardiac Arrest Audit collects such data and hospitals are encouraged to participate.[39]

Key Findings

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

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)*

Back to contents

7 – Period after the cardiac arrest

Outcome after CPR

Outcome after CPR can be measured at different time points and clarity of definition is important to ensure that data are comparable.[40] Table 7.1 below shows the number of patients who had return of circulation and survived the immediate CPR attempt.

Table 7.1 Outcome of CPR attempt

Outcome	n	%
Death	381	65.6
Survival	200	34.4
Subtotal	**581**	
Not answered	4	
Total	**585**	

Whilst 34% of patients had return of circulation after CPR this needs to be considered in the context of overall benefit. Figure 7.1 shows the number of patients who survived the CPR attempt and survived to hospital discharge.

Of the 200 patients who survived the immediate CPR attempt only 85 survived to hospital discharge (14.5% survival to hospital discharge rate: 85/585). This is at the lower end of, but in keeping with, the literature on hospital survival after cardiac arrest, which shows rates of hospital survival from 14-20%.[41,1]

Cardiac arrest can lead to hypoxic-ischaemic cerebral injury and disability in those who survive from cardiac arrest. It is important to understand to what degree this has occurred in order to have a fuller picture of outcome after cardiac arrest. The "Clinical Performance Score" was initially proposed by Jennett and Bond in The Lancet in 1975 as a way of evaluating the outcomes of brain injury, mainly from head trauma.[42] It has been used to determine the neurological status of patients after cardiac arrest, notably in the setting of clinical trials of therapeutic hypothermia[43,44] and is more commonly termed the 'cerebral performance category' (CPC).

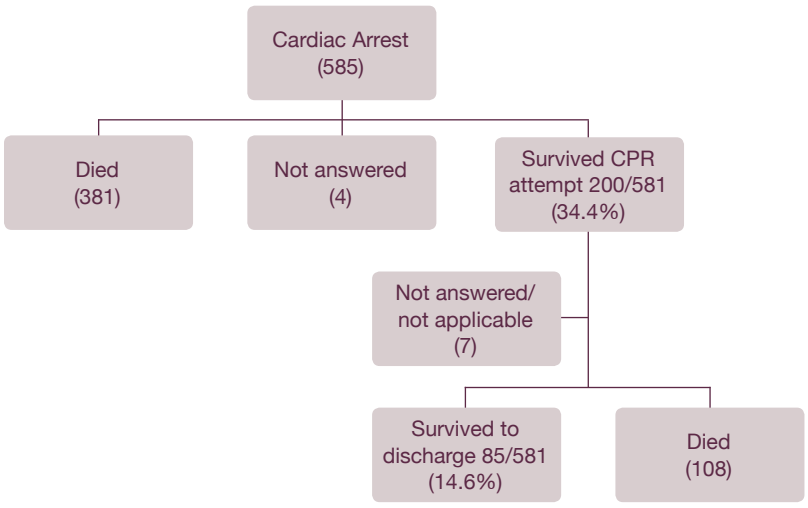

Figure 7.1 Survived to discharge after CPR

Table 7.2 shows clinicians' assessment of cerebral performance category (CPC) at the time of hospital discharge in the group who survived. It is worth remembering that these data were obtained from the clinician questionnaire and that the questionnaire was filled out retrospectively with the aid of case notes only. It is unlikely that formal CPC scoring had been performed and recorded and likely that clinicians had to make a judgment from available notes.

Table 7.2 Cerebral performance category (CPC)

CPC	Total
1. Conscious, alert-normal function	71
2. Conscious, alert-moderate disability	5
3. Conscious, severe disability	1
4. Comatose	1
Subtotal	**78**
Not answered	7
Total	**85**

In this study only 2/78 patients had severe disability or were comatose at time of hospital discharge. It is worth noting that only five patients were classified as CPC 2 – conscious and alert with moderate disability. Whilst it is reassuring that 71 patients were classified as CPC 1 it is possible that the differentiation between CPC 1 and 2 was difficult. Furthermore given the above paragraph it is possible that around half of the individuals with a CPC 1 actually had moderate to severe handicaps that were not recognised and that disability was underestimated.

Despite the face validity of the CPC, studies by Roine et al [45] and Hsu et al [46] have previously demonstrated that there is a low correlation between a score of "2" and functional abilities as measured on a well-standardised scale from critical care, and that nearly half of individuals with a "1" actually have moderate to severe cognitive handicaps. Assessment of quality of life after cardiac arrest survival is complex and the CPC is a crude tool.[47]

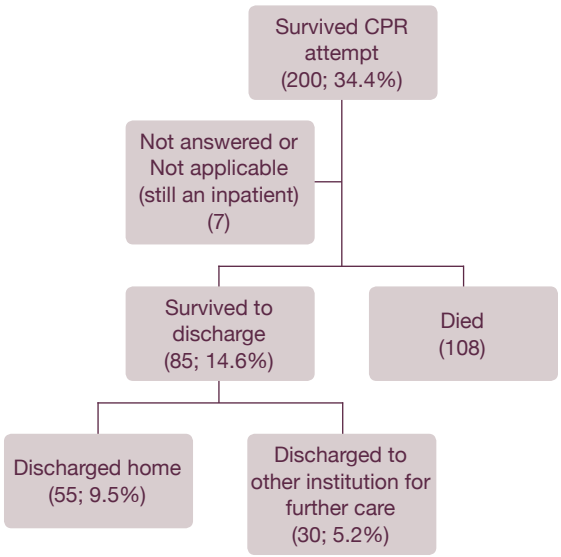

Figure 7.2 Discharge location

Discharge location is shown in Figure 7.2 and perhaps complements the information from Table 7.2 about CPC. 55/581 patients (9.5%) were discharged to their own home. The remainder were either transferred to another hospital or to a nursing home or hospice. The fact that some remained dependent on care again raised the possibility that functional outcome in these patients was not ideal.

Which patients survived to discharge?

Within this section of the study data about factors associated with survival to discharge are presented. It must be noted that these are associations and not necessarily causative factors. These findings do, however, provide some important messages about the study population.

Table 6.4 showed that in the cases where it was possible to answer (591 cases) it was believed that 40% of cardiac arrests were as a result of primary cardiac disease and the other 60% as a result of non-cardiac disease. Figure 7.3 shows hospital survival for these two groups. Survival to discharge was 30% (51/170 cases) in cardiac arrests as a result of primary cardiac disease and was 8% (22/262 cases) in cardiac arrests secondary to non-cardiac disease.

As discussed in the introduction CPR was originally developed to save the lives of people arresting unexpectedly, mostly from cardiac disease and the findings from Figure 7.3 reinforces this objective as this is where CPR is most effective. CPR is now applied to many patients dying as a result of non-cardiac disease in whom it has little chance of working.

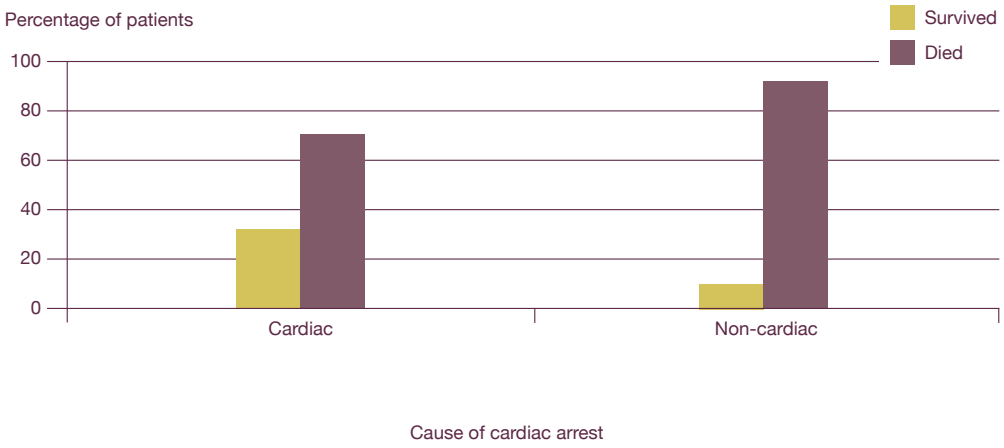

Figure 7.3 Cause of cardiac arrest and survival to discharge *(n=424)*

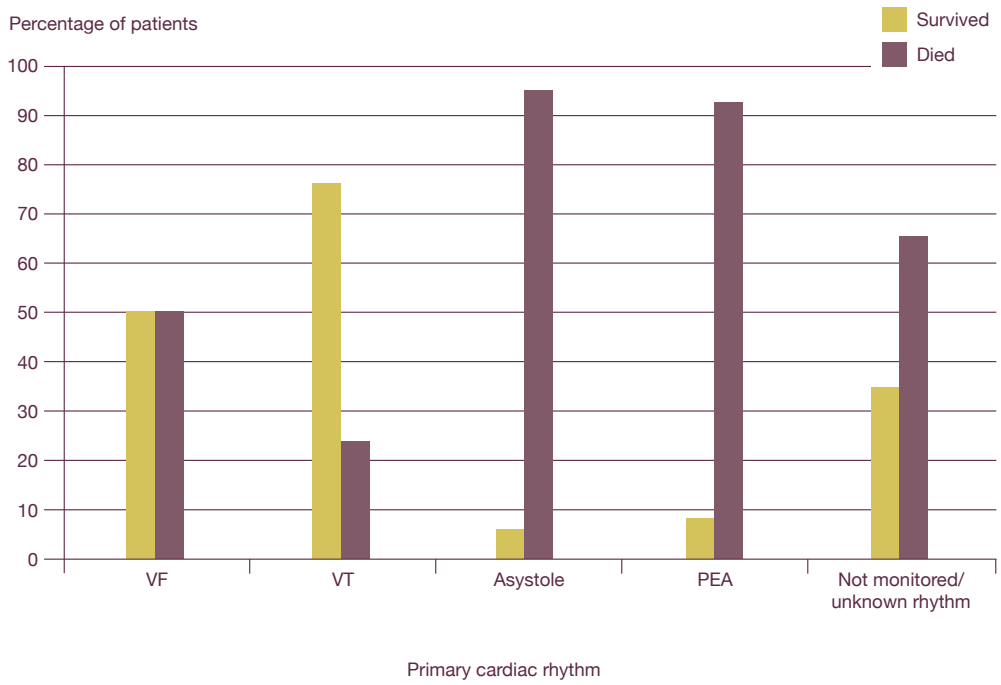

Figure 7.4 Primary cardiac rhythm and survival to discharge *(n=537)*

Initial rhythm when CPR is commenced is associated with different outcomes. Figure 7.4 shows these data.

It can be seen that patients who presented with shockable rhythms had higher survival to discharge rates. Only nine patients presenting with asystole survived to hospital discharge.

Figure 7.5 shows data for the patients who survived to hospital discharge, according to presenting rhythm and whether or not the cause of cardiac arrest was cardiac or non-cardiac.

Only 2/78 patients (2.5%) with asystole secondary to non-cardiac causes and only 12/147 (8%) patients with PEA secondary to non-cardiac causes survived to hospital discharge.

Figure 7.6 shows the association between length of hospital stay prior to cardiac arrest and survival to discharge. Patients who suffered an arrest after longer durations of hospital stay were less likely to survive to discharge. Patients who had been in hospital for more than four days hospital had survival rates of only 8%. As discussed earlier, insufficient time to document or discuss DNACPR was frequently cited as a constraint to decision making. The data from Figure 7.6 shows that that survival to hospital discharge was only 12% in patients who had a hospital stay of longer than one day prior to cardiac arrest (44/376): is it reasonable to cite lack of time in this group of patients?

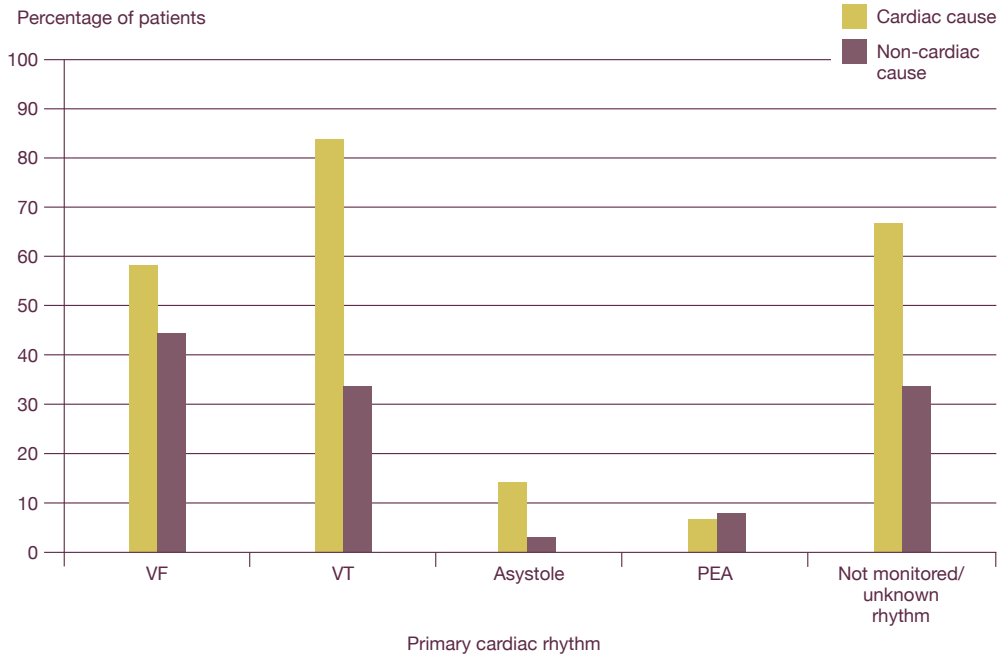

Figure 7.5 Percentage of patients that survived to discharge and type of primary rhythm and cause of cardiac arrest *(n=424)*

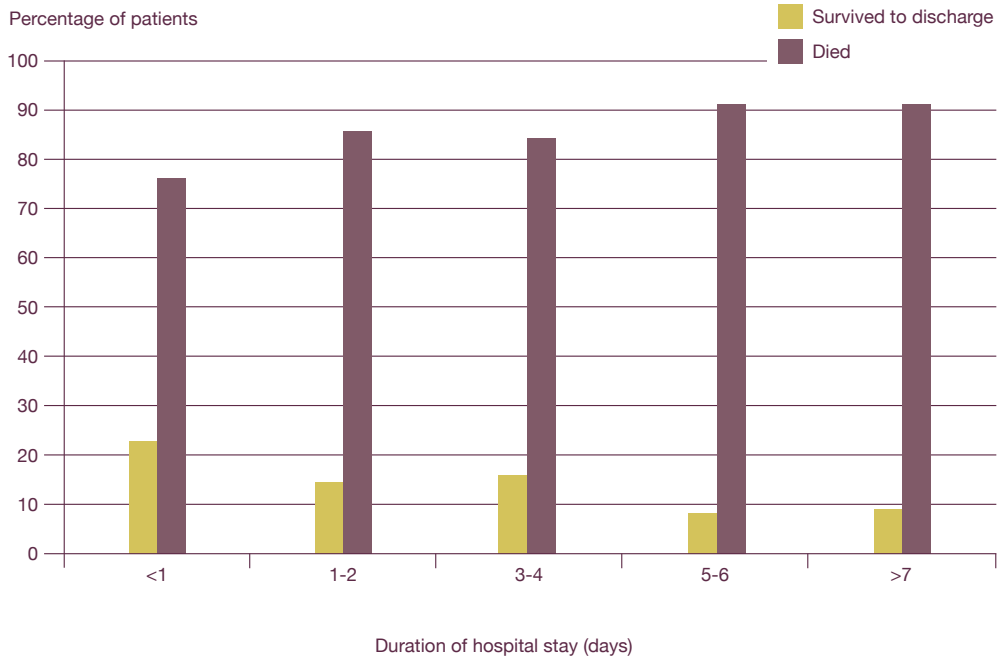

Figure 7.6 Duration of hospital stay and survival to discharge *(n=551)*

Table 7.3 Outcome by time of arrest

	Patient survived to discharge						
Time	**Yes**	**%**	**No**	**%**	**Subtotal**	**Insufficient data to assess**	**Total**
00:00-07:59	13	7.4	163	92.6	**176**	5	**181**
08:00-17:59	44	20.1	174	79.8	**218**	6	**224**
18:00-23:59	15	12.5	105	87.5	**120**	1	**121**
Total	**72**	**14.0**	**442**	**86.0**	**514**	**12**	**526**

Table 7.4 Outcome by day of the week

	Patient survived to discharge						
Day	**Yes**	**%**	**No**	**%**	**Subtotal**	**Insufficient data to assess**	**Total**
Monday to Friday	57	15.4	314	84.6	**371**	7	**378**
Saturday and Sunday	15	10.5	128	89.5	**143**	5	**148**
Total	**72**	**14.0**	**442**	**86.0**	**514**	**12**	**526**

Table 7.5 Outcome by arrests occurring out of hours

	Patient survived to discharge						
Day	**Yes**	**%**	**No**	**%**	**Subtotal**	**Insufficient data to assess**	**Total**
Monday to Friday in hours	52	19.8	210	80.2	**262**	2	**264**
Saturday and Sunday/out of hours	20	7.9	232	92.1	**252**	10	**262**
Total	**72**	**14.0**	**442**	**86.0**	**514**	**12**	**526**

Table 7.3 shows the association between time of day of cardiac arrest and survival to discharge. The variation is considerable: 20.1% during daytime, 12.5 % in the evening and 7.4% at night. Patients having CPR attempts during the day were almost three times more likely to survive than those having CPR attempts at night. The poorer survival of patients having a cardiac arrest at night has previously been shown.[48] It is not clear whether this is due to problems with provision of appropriate personnel and facilities overnight or due to decision making (DNACPR status or post cardiac arrest care) in this period. However it does highlight a particular issue and individual hospitals should pay attention to their own data and the pattern of medical care that can be provided in the overnight period.

Table 7.4 shows survival to discharge by day of cardiac arrest. The hospital survival of patients who had a cardiac arrest at weekends was lower than during the week. The association of weekend admissions with mortality has been found previously.[49] From Table 7.4 it appears that this was also a finding in patients who have a cardiac arrest over the weekend period.

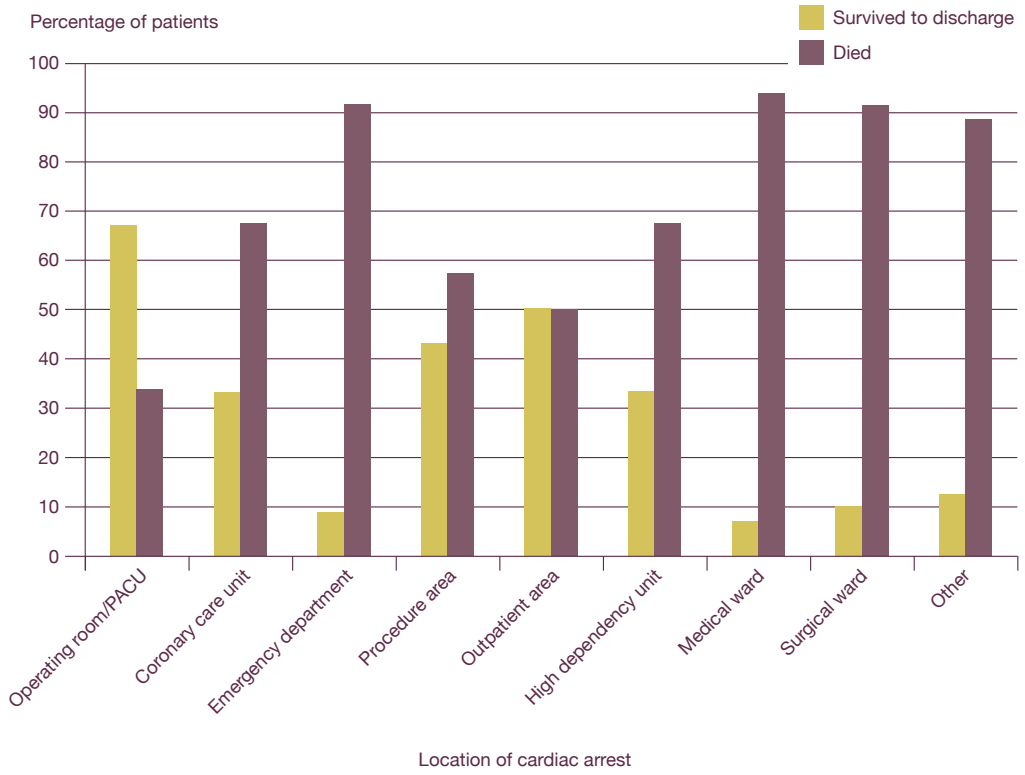

Figure 7.7 Location of cardiac arrest and survival to discharge *(n=547)*

Table 7.5 presents data on cardiac arrests that occurred between the hours of 08:00-18:00 Monday to Friday and cardiac arrests that occurred at weekends and between 18:00-07:58 (out of hours).

It is clear that there was an association between outcome and time of cardiac arrest; patients who had a cardiac arrest during the normal working week had more than double the hospital survival rate of those patients who had a cardiac arrest out of hours or at weekends.

Figure 7.7 shows the association between location at time of cardiac arrest and survival to hospital discharge. It does appear that cardiac arrests that led to the initiation of CPR were associated with a better outcome if they occurred in a highly monitored environment (operating theatre/post anaesthetic care unit, procedure/intervention area, Level 2 care). This may not be surprising. Arrests that occurred in general wards (medical and surgical) or in the emergency department were associated with very poor outcomes. These data are potentially complex as many other factors may be involved – disease state, acute presentation, appropriateness of CPR attempt to name a few.

It is important to remember that the clinician caring for the patient considered that the patient was on the correct ward at the time of cardiac arrest in 521/565 cases (92%) and therefore had no concerns about appropriateness of location for the level of care required.

Table 7.6 Advisors' opinion of appropriateness of whether the patient should have had a DNACPR decision by location.

	Should have had a DNACPR				
Location of cardiac arrest	**Yes**	**No**	**Subtotal**	**Insufficient data to assess**	**Total**
Operating room/post anaesthetic care unit	2	0	**2**	5	**7**
Coronary care unit	14	2	**16**	49	**65**
Emergency department	16	8	**24**	20	**44**
Procedure area	5	3	**8**	25	**33**
Outpatient area	2	1	**3**	4	**7**
Level 2 care	1	1	**2**	3	**5**
Medical ward	68	4	**72**	72	**144**
Surgical ward	59	9	**68**	69	**137**
Other	22	5	**27**	39	**66**
Subtotal	**189**	**33**	**222**	**286**	**508**
Not answered	2	1	**3**	1	**4**
Total	**191**	**34**	**225**	**287**	**512**

The Advisors' opinion of DNACPR, combined with the responsible clinicians' view of appropriateness of location, reinforces the literature that points to cardiac arrests occurring on general wards being associated with poor outcomes and shows that our Advisors believed that CPR attempts in the patients in these locations were very often not indicated. Clinicians who are responsible for patient care in medical and surgical wards should understand the potentially poor outcome for their patients should they have a cardiac arrest and, if the patients' location is believed to be appropriate, be prepared to question the appropriateness of initiating CPR should the patient have a cardiac arrest.

In Chapter 5 it was shown that 52 patients who the clinician had documented that DNACPR was appropriate underwent CPR. Figure 7.8 shows the outcome for these patients.

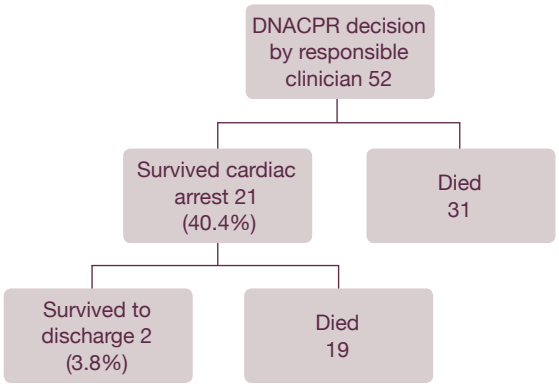

Figure 7.8 Patients who had a DNACPR decision but still underwent CPR

Twenty-one patients survived the resuscitation attempt and 19 of those event survivors died later in their hospital stay. Two patients survived to hospital discharge.

Care after a cardiac arrest

Survivors of CPR require rapid and systematic care if chances of survival and good neurological outcome are to be maximised. Often this starts with some simple investigations to understand better the cause of the cardiac arrest, to determine the degree of physiological derangement and to allow planning of subsequent care. Table 7.7 shows the number of patients who had a range of simple investigations performed in the immediate post arrest period. It is noted that substantial numbers of patients did not have these investigations performed.

Table 7.7 Investigations performed in the immediate post arrest period

Investigations performed	n	%
12 lead ECG	122	79.7
Full blood count	111	72.5
Urea and electolytes	110	71.9
Chest x-ray	89	58.2
Arterial blood gasses	103	67.3

Answers may be multiple (n/153; not answered in 55)

One reason for apparent 'deficiencies' in post cardiac arrest care may be that patients were considered to be dying and that active therapy was no longer considered appropriate. Table 7.8 shows that in the post arrest period 84/191 (44%) were made DNACPR in the event of a further cardiac arrest. As discussed earlier it is possible that full and active therapy would still be delivered to these patients and so a DNACPR decision does not rule out elements of post cardiac arrest care. However it does raise the likelihood that many patients may have been managed with a more palliative approach. Table 7.8 also shows that all but 11 of the patients with a DNACPR decision died in hospital which raises again the question of whether some of these patients should have had a DNACPR decision in the first instance.

It is recognised that interventional cardiology has a significant role to play in patients who have a cardiac arrest secondary to myocardial ischaemia. In those patients who survived the cardiac arrest, Advisors were asked to consider if the cause of the arrest was likely to be due to myocardial ischaemia. Advisors considered that this was likely in 100/190 cases with sufficient information to make an assessment.

In those 100 patients with likely myocardial ischaemia as a cause for the cardiac arrest data were extracted from the case notes to assess if cardiology input was requested, angiography considered or angiography/ intervention undertaken. Figure 7.9 shows the results of this analysis.

Table 7.8 Outcome when a DNACPR order was made after CPR

	Patient survived to discharge					
Following CPR, DNACPR order was made	**Yes**	**No**	**Subtotal**	**Not applicable**	**Not answered**	**Total**
Yes	11	72	**83**	0	1	**84**
No	70	33	**103**	1	3	**107**
Subtotal	**81**	**105**	**186**	**1**	**4**	**191**
Unknown	4	3	**7**	0	2	**9**
Total	**85**	**108**	**193**	**1**	**6**	**200**

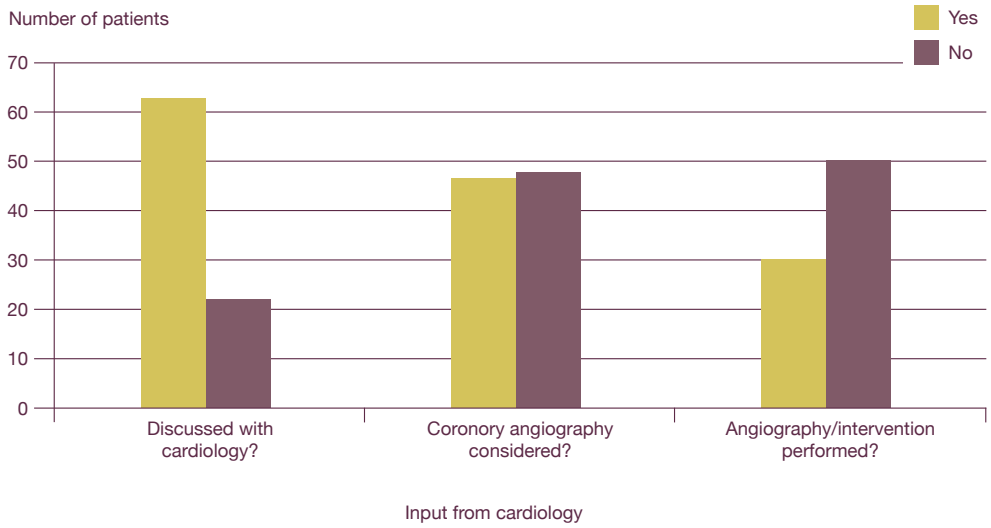

Figure 7.9 Cardiology input in patients with CVS aetiology *(n=100)*

It is well recognised that post-cardiac-arrest patients with ST elevation myocardial infarction (STEMI) should undergo early coronary angiography and percutaneous coronary intervention (PCI).[50,51] However, chest pain and/or ST elevation are relatively poor predictors of acute coronary occlusion in these patients.[52] For this reason this intervention should be considered in all post-cardiac-arrest patients who are suspected of having coronary artery disease as the cause of their arrest.[52-54]

From the findings in this study it appears that there was a relatively low use of PCI after cardiac arrest. This may be due to an over-estimate, by the Advisors, of cases where it was thought that myocardial ischaemia may be a factor. However, if patients are to have maximal chance of good outcomes the importance of PCI after cardiac arrest must be understood and arrangements put in place to ensure this can be delivered reliably when required.

Quality of care immediately following CPR

Advisors were asked to grade the quality of clinical care in the immediate (up to first hour) post arrest period and also decision making in this immediate period. Figure 7.10 shows these opinions.

Whilst it is reassuring that such high numbers of patients were thought to have received good care and good decision making in the immediate post arrest period, there does appear to be opportunities to improve. Where decision making was considered less than good the reasons for this are given in Table 7.9.

Table 7.9 Reasons for poor decision making

Reasons	Total
Speed of decision making	8
Clarity about care required	22
Seniority of decision making	17
Other	9

Answers may be multiple (n/49)

It is a theme running through this report that lack of clarity about the care required (both before and after cardiac arrest) and seniority of decision making to ensure the most appropriate treatment are deficiencies. Addressing both of these will bring significant improvements to this group of patients.

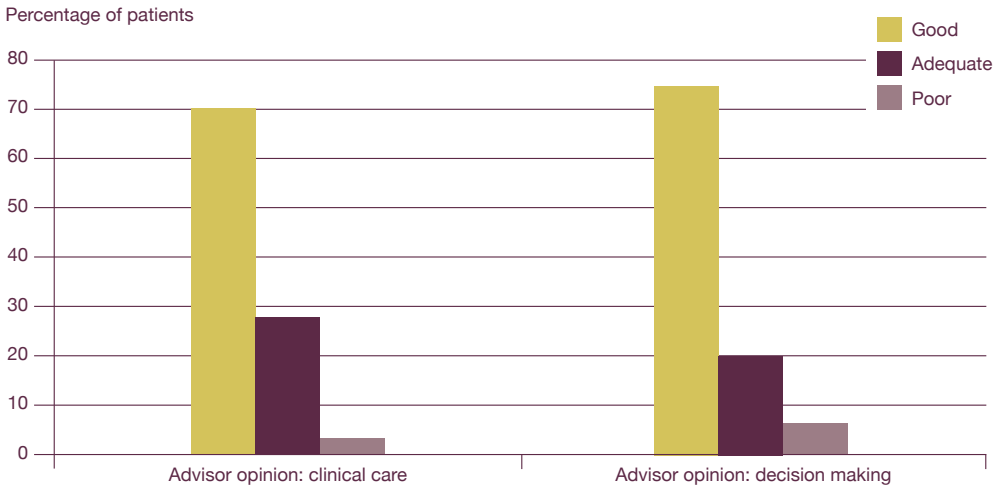

Figure 7.10 Advisor opinion on quality of care immediately following CPR
(Clinical care n=177; Decision making n=189)

Table 7.10 Appropriate location after the arrest - Advisors' opinion

Appropriate location after the cardiac arrest	n	%
Yes	194	95.1
No	10	4.9
Subtotal	**204**	
Insufficient data to assess	4	
Total	**208**	

Table 7.11 Referred to critical care after the arrest

Referred to critical care	Total	%
Yes	109	64.1
No	61	35.9
Subtotal	**170**	
Insufficient data to assess	38	
Total	**208**	

Advisor opinion of post cardiac arrest location is given in Table 7.10. In most cases the Advisors felt that the location was appropriate to the needs of the patient. In 10 cases this was not so and of those cases it was stated that five patients should have received a higher level of care and in four cases there was no benefit to the higher level of care provided.

Critical care

It has been estimated that there are approximately 30,000 treated out of hospital cardiac arrests and 20,000 treated in-hospital cardiac arrests each year in the UK and approximately 6350 of these (12.7%) will be admitted to an intensive care unit.[55] It has been established that interventions in the post-resuscitation period have a significant influence on the ultimate outcome.[53,56] Table 7.11 shows that 109 patients were referred to critical care for consideration of admission after cardiac arrest.

Table 7.12 Grade of clinician who referred the patient to critical care

Grade of clinician	Total
Consultant	17
Staff grade	2
Senior specialist trainee	39
Junior specialist trainee	23
Basic grade	6
Other	1
Subtotal	**88**
Insufficient data to assess	21
Total	**109**

It was not possible to ascertain the grade of referring clinician in 21/109 cases. However in the remaining 88 cases, only 17 cases were referred by consultants (19%) (Table 7.12). Earlier in this study data demonstrated that there were often concerns about decision making (both in speed and clarity of decision making) and this relatively low level of consultant involvement in post cardiac arrest care decision making appeared poor.

Table 7.13 Outcome of referral to critical care

Outcome	n	%
Admitted	75	68.8
Not admitted	34	31.2
Total	**109**	

Table 7.13 shows that of the patients referred to critical care 34/109 were declined admission and 75 patients were admitted.

Table 7.14 Grade of clinician making the decision to admit the patient to intensive care

Grade of clinician	Admitted	Not admitted	Total
Consultant	27	17	44
Senior specialist trainee	19	7	26
Junior specialist trainee	6	1	7
Subtotal	**52**	**25**	**77**
Insufficient data to assess	23	9	32
Total	**75**	**34**	**109**

Table 7.14 shows the grade of staff involved in the decision on admission to critical care. Just over half of the decisions were made by consultants (44/77; 57%). Although the numbers are quite small it is interesting to note that the proportion of referrals admitted to critical care was lower for consultants than senior trainees with junior trainees admitting the highest proportion. It may be that consultants are involved with the more complex patients and that this explains the difference. However, senior decision making is key to ensuring that the correct care is provided and this is very important in acute situations such as those surrounding a cardiac arrest. Earlier NCEPOD work has highlighted the importance of consultant involvement in decisions to admit to critical care and this message needs to be reinforced.[2]

Table 7.15 Reason for no admission to critical care

Reason	Total
No need for admission, patient would recover with lower level care	3
No need for admission, patient expected to die	26
No critical care beds, patient would have been admitted but no facility	1
Other	4
Total	**34**

Case study 13

A middle-aged patient collapsed while shopping. Bystander CPR was started and an ambulance was called. When the ambulance arrived the patient was found to be in VF and was defibrillated with an immediate return of spontaneous circulation. By the time the patient arrived in the emergency department they were awake and mildly confused but otherwise physiologically stable. ECG showed evidence of acute myocardial infarction. The patient was referred for an urgent cardiology opinion. Whilst with the cardiology SpR the patient had another VF cardiac arrest. Resuscitation continued for 25 minutes before return of spontaneous circulation. As the patient was unconscious, intubated and making no respiratory effort a referral was made to the critical care unit. The patient was seen by an SpR in critical care who stated the patient was not suitable to be admitted to intensive care. The patient was extubated and died shortly after.

The decision not to admit this patient to critical care was questioned by the Advisors. The patient was previously in reasonable health and had received prompt and appropriate CPR. In the opinion of the Advisors the patient should have received treatment for the myocardial infarction and supportive care in a critical care unit. The Advisors also questioned the apparent lack of consultant input into the decision making in the peri-arrest period.

Table 7.15 shows the reasons why those patients who were referred for critical care were not accepted. It is not surprising that the majority of this group were not admitted to critical care as they were expected to die. It is unacceptable that lack of a critical care bed was the reason for not providing appropriate post cardiac arrest care, even in just one patient.

Table 7.16 gives details on critical care admissions for all patients who survived the cardiac arrest (including both patients where the referral for critical care admission was documented and those where it was not). Only 84/202 (41%) patients were admitted to critical care for post cardiac arrest management.

Table 7.16 Patient was admitted to critical care (all surviving patients)

Admitted to critical care	n	%
Yes	84	41.6
No	118	58.4
Subtotal	**202**	
Insufficient data to assess	6	
Total	**208**	

Table 7.17 Reason patient was not admitted to critical care

Reason	n	%
No need for admission, patient would recover with lower level care	32	28.3
No need for admission, patient expected to die	66	58.4
No critical care beds, patient would have been admitted but no facility	2	1.8
Other	13	11.5
Subtotal	**113**	
Not answered	5	
Total	**118**	

Where patients were not admitted to critical care the Advisors were asked to classify why this was. In the majority of cases this was due to futility as the patient was expected to die, although in 32/113 cases it was felt that recovery with current level of care was to be expected (Table 7.17).

Table 7.18 Appropriate admission to critical care - Advisors' opinion

Appropriate admission	Total
Yes	78
No	5
Subtotal	**83**
Insufficient data	1
Total	**84**

Advisor opinion of appropriateness of a Level 3 admission in those patients who were admitted is shown in Table 7.18. It was felt that most admissions were appropriate but in a few cases it was felt that the patient was likely to die irrespective of critical care admission.

Table 7.19 Treatment limitation decisions for the patients admitted to critical care

Treatment limitation	Total
Not for ventilation	11
Not for renal replacement therapy	8
Not for inotropic support	5
Not for escalation of care above current level of organ support	28
Other	7

Answers may be multiple (n/41)

Table 7.20 Opinion of appropriate organ support

Appropriate organ support	n	%
Yes	105	95.5
No	5	4.5
Subtotal	**110**	
Insufficient data to assess	98	
Total	**208**	

Treatment limitation can be an appropriate way of ensuring that treatments that will bring no ultimate benefit are not provided and that the dying process is not prolonged. Advisor opinion was that all but five patients had appropriate organ support provided. In one patient it was felt that respiratory support should have been provided and in two patients it was felt that renal support should have been provided and in one patient cardiovascular support was deficient. It appears that the treatment limitation decisions in Table 7.19 were appropriate. Only nine patients were actively cooled in the post arrest period. Table 7.21 shows the number of patients (admitted to critical care) with obtunded cerebral function after cardiac arrest.

Table 7.21 Obtunded cerebral function

Obtunded cerebral function	Total
Yes	49
No	21
Subtotal	**70**
Insufficient data to assess	14
Total	**84**

There is good evidence that cooling in the immediate post arrest period improves outcome in out of hospital VF arrests[43,57] and there is some lower level evidence (observational data only) indicating that induced hypothermia may be beneficial after cardiac arrest from non-shockable rhythms and after in-hospital cardiac arrest. However, this is controversial. The data from this study show that cooling was infrequent, not even in the presence of obtunded neurological function.

Of the 84 patients admitted to critical care 28 survived to hospital discharge. Table 7.22 shows the number of patients in whom life-sustaining therapies were withdrawn during the stay in critical care.

Table 7.22 Life-sustaining therapies were withdrawn

Therapies withdrawn	n	%
Yes	38	48.7
No	40	51.3
Subtotal	**78**	
Insufficient data to assess	6	
Total	**84**	

Life sustaining therapies were withdrawn in 38 cases and in the opinion of the Advisors this was the correct decision in all cases (35) where they could form an opinion. In 13 of these 38 cases life sustaining therapies were withdrawn on the basis of predicted poor neurological outcome.

In the 13 patients who had life sustaining therapies withdrawn on the basis of poor neurological outcome this decision was made within 24 hours of cardiac arrest in four cases and within 48 hours of cardiac arrest in seven patients. Prediction of neurological outcome is unlikely to be reliable until at least three days after cardiac arrest; if therapeutic hypothermia has been used it may extend this time to five to six days after cardiac arrest.[58]

Organ donation is a possible option to consider in patients in intensive care when active life sustaining therapies are being withdrawn. Within this study it appeared that it was only considered in six of the 33 cases where it could have been an option. There are many issues that may preclude organ donation and we did not collect data on these. However it is important to highlight the potential for organ donation and ensure that this is considered as a usual part of the dying process in all potential organ donors.[33,59]

Table 7.23 Organ donation was considered (in ICU patients where life-sustaining therapy was withdrawn)

Organ donation was considered	Total
Yes	6
No	19
Subtotal	**25**
Insufficient data to assess	13
Total	**38**

Key Findings

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

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)*

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8 – Overall assessment of care

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

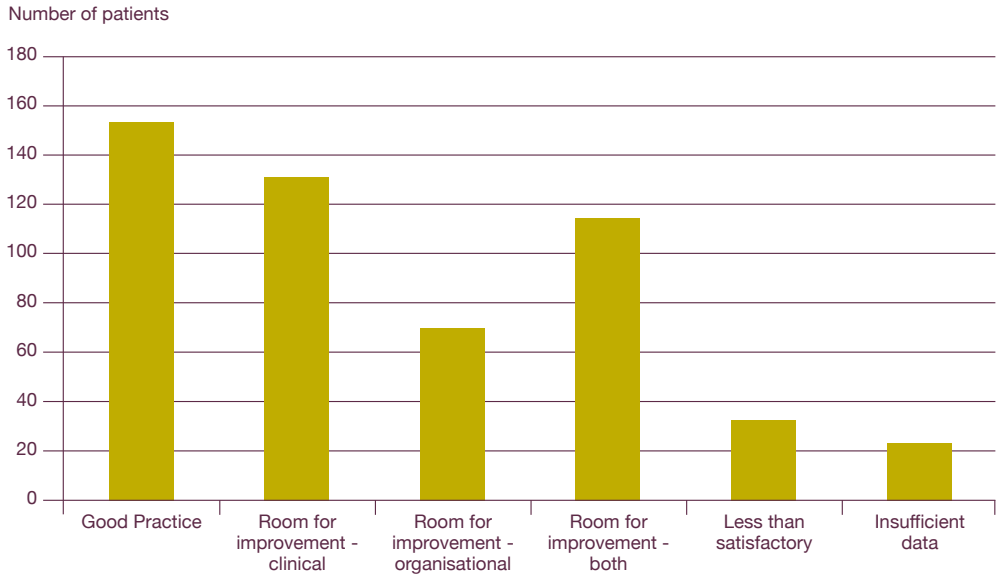

Figure 8.1 Overall quality of care - Advisors' opinion

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.

From Table 8.1 overleaf it is clear that there are big differences when the data are displayed in this way. Of the group who survived 61% were judged to have received good care as opposed to 26% of the group who died. This analysis is potentially subject to have criticism that it was done in the knowledge of the outcome of the patients and this may have influenced the judgement. However it appears that patients who died in hospital were believed to have less than good care in three out of four cases and that most of the deficiencies in care were associated with the 'room for improvement in clinical care' (including decision making and CPR status).

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 8.1 Advisors' opinion of quality of care for those patients who survived to hospital discharge (Yes) and those who died in hospital (No).

	Patient survived to discharge						
Quality of care	**Yes**	**%**	**No**	**%**	**Insufficient data to assess**	**Not answered**	**Total**
Good practice	42	60.9	109	25.6	2	1	154
Room for Improvement-clinical	10	14.5	121	28.5	0	1	132
Room for improvement- organisational	9	13.0	60	14.1	0	1	70
Room for improvement - both	8	11.6	105	24.7	1	1	115
Less than satisfactory	0	0.0	30	7.1	1	2	33
Subtotal	**69**		**425**		**4**	**6**	**504**
Insufficient data to assess	3		17		2	0	22
Total	**72**		**442**		**6**	**6**	**526**

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**

Where care was considered to be less than good the Advisors were asked if they considered that the deficiencies may have contributed to death. Table 8.3 shows the response.

Table 8.3 Less than good care contributed to death - Advisors' opinion

Less than good care contributed to the patients' death	**Total**	**%**
Yes	81	31.9
No	173	68.1
Subtotal	**254**	
Insufficient data to assess	75	
Total	**316**	

There was sufficient information to answer this question in 254/316 cases. In 81/254 cases the Advisors felt that deficiencies in care may have contributed to the death of the patient (32% of cases rated as less than good care, with sufficient information to form an opinion).

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.

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Glossary

2222 calls	The most common emergency number called to alert medical staff to a patient having a cardiac arrest
ADL (see also Appendix 4 - Barthel Index)	Activities of Daily Living
ALS trained	The individual has completed the Resuscitation Council (UK) Advanced Life Support (ALS) course and holds a Resuscitation Council (UK) ALS Provider certificate, which is valid for 4 years The ALS course is a standardised national course teaching evidence-based resuscitation guidelines and skills to healthcare professionals including the knowledge and skills required to:- Recognise and treat the deteriorating patient using a structured ABCDE approach; Treat cardiac and/or respiratory arrest, including starting CPR, manual defibrillation, life threatening arrhythmias, and post resuscitation care; Care for the deteriorating patient or patient in cardiac and/or respiratory arrest in special circumstances such as anaphylaxis, and pregnancy; Lead a team, work as a team member, and use structured communication skills including giving an effective handover
Ascites	Is excess fluid in the space between the tissues lining the abdomen and abdominal organs
Asystole	A state of no electrical activity in the heart
Basic life support	This refers to maintaining airway patency and supporting breathing and the circulation
BMI	Body Mass Index
BP	Blood Pressure
Cardiac arrest	Cardiac arrest is the cessation of cardiac mechanical activity as confirmed by the absence of signs of circulation. For the purposes of this study- receiving chest compressions or defibrillation
CCU	Coronary Care Unit
CPC	Cerebral Performance Category - This is a measure of functional outcome after cardiac arrest
CPR	Cardiopulmonary Resuscitation
CT	Computed Tomography
Defibrillator - AED	**Automated External Defibrillator** An automated external defibrillator is a defibrillator that analyses the heart rhythm, determines whether a shock is appropriate and provides audio prompts to the operator. When prompted the operator pushes a button to deliver a shock to the patient.
Defibrillator - Manual	Purely manual defibrillators do not incorporate rhythm analysis software - the operator must interpret the rhythm, determine whether a shock is appropriate and, if so, charge the defibrillator and deliver the shock

Defibrillator - Shock advisory	A shock advisory defibrillator can operate in either manual or AED modes - the preferred mode is selected by the operator
DNACPR/DNAR	Do Not Attempt Cardiopulmonary Resuscitation/Do Not Attempt Resuscitation
Early warning score	A simple physiological scoring system that can be calculated at the patient's bedside, using parameters which are measured in the majority of unwell patients. It is calculated for a patient using five simple physiological parameters: mental response, pulse rate, systolic blood pressure, respiratory rate and temperature. Points are allocated to deviations from the normal range in each parameter, and an overall score is then calculated
ECG	Electrocardiograph
ED	Emergency Department
GCS	Glasgow Coma Scale
GP	General Practitioner
IV	Intravenous
Monitored cardiac arrest	The patients physiological parameters are being monitored at the time of the arrest
NHS	National Health Service
Outreach team	Also known as a 'Medical Emergency Team' or 'Rapid Response Team'. Their purpose is to provide immediate care to patients on the ward who show signs of physiological instability or clinical deterioration. They provide intervention to prevent, rather than treat, cardiorespiratory arrest
PCI	Percutanous Coronary Intervention
PEA	Pulseless electrical activity
Resuscitation team	A team that is activated in response to a cardiopulmonary arrest. Ideally, the team should include at least two doctors with current training in advanced life support. The exact composition of the team will vary between institutions, but overall the team must have the following skills: Airway interventions, includingtracheal intubation; Intravenous cannulation, including central venous access; Defibrillation (advisory and manual) and cardioversion; Drug administration; Ability to undertake advanced resuscitation skills (e.g. external cardiac pacing, Skills required for post-resuscitation care
STEMI	ST elevation Myocardial Infarction occurs when a coronary artery becomes totally blocked
Track and trigger	Track & Trigger system is used to calculate a patient's physiological score, and a designated trigger level is agreed; when this is reached, nursing staff alert a clinician. Other calling criteria, based upon routine observations, are activated when one or more variables reaches an extreme value outside the normal range.
VF	Ventricular Fibrillation
VT	Ventricular Tachycardia
Witnessed cardiac arrest	A witnessed cardiac arrest is one that is seen or heard by another person

Appendices

Appendix 1 **DNACPR - Example form**

DO NOT ATTEMPT CARDIOPULMONARY RESUSCITATION

Adults aged 16 years and over

Name

Address

Date of birth

NHS or hospital number

Date of DNAR order: / /

DO NOT PHOTOCOPY

In the event of cardiac or respiratory arrest no attempts at cardiopulmonary resuscitation (CPR) will be made. All other appropriate treatment and care will be provided.

1 Does the patient have capacity to make and communicate decisions about CPR? YES / NO
If "YES" go to box 2

If "NO", are you aware of a valid advance decision refusing CPR which is relevant to the current condition? YES / NO
If "YES" go to box 6

If "NO", has the patient appointed a Welfare Attorney to make decisions on their behalf? YES / NO
If "YES" they must be consulted.

All other decisions must be made in the patient's best interests and comply with current law.
Go to box 2

2 Summary of the main clinical problems and reasons why CPR would be inappropriate, unsuccessful or not in the patient's best interests:

3 Summary of communication with patient (or Welfare Attorney). If this decision has not been discussed with the patient or Welfare Attorney state the reason why:

4 Summary of communication with patient's relatives or friends:

5 Names of members of multidisciplinary team contributing to this decision:

6 Healthcare professional completing this DNAR order:

Name Position

Signature Date Time

7 Review and endorsement by most senior health professional:

Signature Name Date

Review date (if appropriate)

Signature Name Date

Signature Name Date

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Appendix 2

Definitions of comorbidities

Chronic disease	Definition
Respiratory	Including: Chronic pulmonary disease resulting in severe exercise restrictions (e.g. unable to perform household duties or climb stairs); Documented chronic hypoxia; Hypercapnia; Secondary polycythemia; Severe pulmonary hypertension (>40 mmHg); Ventilator dependency.
Renal	Receiving chronic dialysis.
Immuno- suppression	The patient has received therapy that suppresses resistance to infection (e.g. immunosuppression, chemotherapy, radiation, long-term or recent high dose steroids.) or has a disease that is sufficiently advanced to suppress resistance to infection (e.g. Leukaemia, Lymphoma, AIDS).
Cardio- vascular	New York Heart Association Functional Classification - Class IV: Severe limitations. Experiences symptoms even while at rest.
Liver Insufficiency	Including: Biopsy-proven cirrhosis; Documented portal hypertension; Episodes of past upper GI bleeding attributed to portal hypertension; Prior episodes of hepatic failure/ encephalopathy/coma.

Appendix 3

McCabe Classification

Category 1	Non-fatal diseases (e.g. diabetes, genitourinary, gastrointestinal or obstetric conditions)
Category 2	Ultimately fatal (diseases estimated to become fatal within 4 years e.g. metastatic carcinomas, cirrhosis, chronic renal disease)
Category 3	Rapidly fatal (e.g. acute leukemia)

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Appendix 4

Barthel Index

The Barthel Index consists of 10 items that measure a person's daily functioning specifically the activities of daily living (ADL) and mobility. The assessment can be used to determine a baseline level of functioning and can be used to monitor improvement in activities of daily living over time. The items are weighted according to a scheme developed by the authors. The person receives a score based on whether they have received help while doing the task. The scores for each of the items are summed to create a total score. The higher the score the more "independent" the person. Independence means that the person needs no assistance at any part of the task.

Bowels

2 Continent (for preceding week)
1 Occasional accident (once a week or less)
0 Any worse grade of incontinence

Grooming

1 Independent washing face, combing hair, shaving and cleaning teeth (when implements provided)
0 Help needed

Bladder

2 Continent (for preceding week) or able to manage any device (e.g. catheter and bag) without help
1 Occasional accident (once a day or less), or catheterised and needs help with device
0 Any worse grade of incontinence

Transfer

3 Needs no help
2 Needs minor help, verbal or physical: can transfer with one person easily, or needs supervision
1 Needs major help: two people or one strong/trained person, but can sit unaided
0 Cannot sit: needs skilled lift by two people (or hoist) Not able to assess

Toilet Use

2 Able to get on and off toilet or commode, undress and dress sufficiently, and wipe self without physical or verbal help
1 Needs some help, can wipe self and do some of the rest with minimal help only
0 Needs more help than this

Dressing

2 Independent putting on all clothes, including fasteners, zips, etc. (clothes may be adapted)
1 Needs some help but can do at least half
0 Needs more help than this

Mobility

3 May use aid (stick or frame, etc., not wheelchair)
2 Needs help of one person, verbal or physical, including help standing up
1 Independent in wheelchair, including able to negotiate doors and corners unaided
0 Needs more help than this

Stairs

2 Independent up and down, and can carry any necessary walking aid
1 Needs help verbal or physical, or help carrying aid
0 Unable

Bathing

1 Able to get in and out of bath or shower, wash self without help (may use aids)
0 Unable

Mahoney FI, Barthel DW:Functional evaluation: the Barthel Index. Md State Med J 14:2, 1965

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Appendix 5

Grade of clinicians/health care professionals

Consultant
Staff Grade or Associate Specialist
Trainee with CCT
Senior Specialist Trainee (SpR3+ or ST5)
Junior Specialist Trainee (SpR1, SpR2 , ST3 and ST4)
Basic Grade (ST1, ST2, FY1, FY2 or CTs)
Specialist Nurse Practitioner
Other Registered Nurse
Resuscitation Officer

Appendix 6

Levels of care

Level 1 care - ward care

Level 2 care - high dependency unit (HDU)
A specialist unit in a hospital, where patients requiring a high level of specialist intervention are cared for. High dependency unit care is appropriate for: patients needing support for a single failing organ, but excluding those needing advanced respiratory support; patients who can benefit from more detailed observation than can be safely provided on a general ward; patients no longer needing intensive care, but not yet well enough to be returned to a general ward; or postoperative patients who need close monitoring for longer than a few hours, i.e. the period normally spent in a recovery area.

Level 3 care - An intensive care unit (ICU/ITU)
A specialist area to which patients are admitted for treatment of actual or impending organ failure, especially when mechanical ventilation is necessary.

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Appendix 7

Ceilings of care - an example document

Gloucestershire Hospitals NHS
NHS Foundation Trust

Unwell/Potentially Deteriorating Patient Plan

Name:
Date of Birth: DD / MM / YYYY
MRN Number:
NHS Number:
OR AFFIX HOSPITAL LABEL HERE

If the patient's condition changes (ie deterioration OR improvement) review this form.
If necessary complete a new form, clearly delete old form by crossing through with signature and date.

Where appropriate discuss with patient and NOK/nominated representative. Document this discussion (refer to Trust MCA Policy and DNACPR Policy).

Hospital:	Ward:	Admission Date:	Consultant:

Diagnosis/ Clinical Context:

Treatment options
Cardiopulmonary Resuscitation (CPR), Do Not Attempt Cardiopulmonary Resuscitation (DNACPR), Department of Critical Care (DCC)

- ☐ 1. Attempt CPR and refer to DCC if patient deteriorates
- ☐ 2. DNACPR but refer to DCC if patient deteriorates
- ☐ 3. DNACPR and do not refer to DCC if patient deteriorates - give active ward care
- ☐ 4. DNACPR and do not refer to DCC if patient deteriorates - patient likely to be dying, consider palliative care referral

General management goals:

Attempt CPR and refer to DCC if patient deteriorates

(If category 2, 3, 4: Attach DNACPR sticker here)

Doctor making decision:			
Status:			
Doctor's signature (if available):		Print name:	Date: DD / MM / YYYY
Member of staff recording decision if Doctor not available:			
Signature:	Status:	Print name:	Date: DD / MM / YYYY

Senior doctor with whom care discussed (if not signatory):

TO BE FILED IN THE CLINICAL RECORD SECTION OF THE HEALTH RECORD

Reprinted with thanks: Gloucester Hospitals NHS Foundation Trust

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Appendix 8

The role and structure of NCEPOD

The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) is an independent body to which a corporate commitment has been made by the Medical and Surgical Colleges, Associations and Faculties related to its area of activity. Each of these bodies nominates members on to NCEPOD's Steering Group.

Steering Group as at 1st June 2012

Dr I Wilson	Association of Anaesthetists of Great Britain and Ireland
Mr F Smith	Association of Surgeons of Great Britain & Ireland
Dr C Mann	College of Emergency Medicine
Dr S Bridgman	Faculty of Public Health Medicine
Professor R Mahajan	Royal College of Anaesthetists
Dr A Batchelor	Royal College of Anaesthetists
Vacancy	Royal College of General Practitioners
Ms M McElligott	Royal College of Nursing
Dr E Morris	Royal College of Obstetricians and Gynaecologists
Mrs M Wishart	Royal College of Ophthalmologists
Dr I Doughty	Royal College of Paediatrics and Child Health
Dr R Dowdle	Royal College of Physicians
Professor T Hendra	Royal College of Physicians
Dr S McPherson	Royal College of Radiologists
Mr R Lamont	Royal College of Surgeons of England
Mr M Bircher	Royal College of Surgeons of England
Mr D Mitchell	Faculty of Dental Surgery, Royal College of Surgeons of England
Dr M Osborn	Royal College of Pathologists
Ms S Panizzo	Patient Representative
Mrs M Wang	Patient Representative

Observers

Mrs J Mooney	Healthcare Quality in Partnership (HQIP)
Dr R Hunter	Coroners' Society of England and Wales

NCEPOD is a company, limited by guarantee (Company number: 3019382) and a registered charity (Charity number: 1075588), managed by Trustees.

Trustees

Mr B Leigh - Chairman
Dr D Justins - Honorary Treasurer
Professor M Britton
Professor J H Shepherd
Professor L Regan
Professor R Endacott

Company Secretary - Dr M Mason

Clinical Co-ordinators

The Steering Group appoint a Lead Clinical Co-ordinator for a defined tenure. In addition there are seven Clinical Co-ordinators who work on each study. All Co-ordinators are engaged in active academic/clinical practice (in the NHS) during their term of office.

Lead Clinical Co-ordinator	Dr G P Findlay (Intensive Care)
Clinical Co-ordinators	Dr M Juniper (Medicine) Dr K Wilkinson (Anaesthesia) Dr A P L Goodwin (Anaesthesia) Mr I C Martin (Surgery) Professor M J Gough (Surgery) Professor S B Lucas (Pathology)

Supporting organisations

The organisations that provided funding to cover the cost of this study:

Heathcare Quality in Partnership on behalf of the Department of Health in England, the Welsh Assembly Government and the Department of Health, Social Services and Public Safety (Northern Ireland) also the States of Guernsey Board of Health and States of Jersey, Health and Social Services. Funding is for the Clinical Outcome Review Programme into Medical and Surgical Care.

Aspen Healthcare Ltd
BMI Healthcare
BUPA Cromwell
Classic Hospitals
East Kent Medical Services Ltd
Fairfield Independent Hospital
HCA International
Hospital of St John and St Elizabeth
Isle of Man Health and Social Security Department
King Edward VII's Hospital Sister Agnes
New Victoria Hospital
Nuffield Health
Ramsay Health Care UK
Spire Health Care
St Anthony's Hospital
St Joseph's Hospital
The Horder Centre
The Hospital Management Trust
The London Clinic
Ulster Independent Clinic

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Appendix 9

Participation

Trust Name	Number of hospitals	Number of completed organisational questionnaires received	Number of hospitals returning other organisational data*	Number of hospitals that returned spreadsheet data or informed of null-return	Number of resuscitation forms received	Number of cases identified for inclusion	Questionnaires returned	Valid reason for non-return of questionnaire	Case notes received	Valid reason for non-return of case notes
Abertawe Bro Morgannwg University Health Board	11	9	0	8	11	11	7	1	7	0
Aintree Hospitals NHS Foundation Trust	1	1	0	1	0	3	2	1	2	0
Airedale NHS Trust	1	0	0	0	2	2	2	0	1	0
Aneurin Bevan Local Health Board	9	8	1	7	11	13	5	4	5	3
Anglian Community Enterprise	2	0	0	2	0	0	0	0	0	0
Ashford & St Peter's Hospital NHS Trust	2	2	0	1	6	5	4	0	5	0
Aspen Healthcare	3	2	0	2	0	0	0	0	0	0
Barking, Havering & Redbridge University Hospitals NHS Trust	2	2	0	0	3	0	0	0	0	0
Barnet and Chase Farm Hospitals NHS Trust	2	2	0	0	7	7	4	0	2	0
Barnsley Hospital NHS Foundation Trust	1	1	0	0	2	2	1	1	1	0
Barts and The London NHS Trust	4	4	0	3	3	2	2	1	2	0
Basildon & Thurrock University Hospitals NHS FoundationTrust	1	1	0	0	7	8	6	0	8	0
Bedford Hospital NHS Trust	1	1	0	0	1	1	1	0	1	0
Belfast Health and Social Care Trust	4	4	0	1	5	8	8	1	8	0
Benenden Hospital	1	1	0	0	1	1	1	0	1	0
Berkshire Healthcare NHS Foundation Trust	3	0	0	0	0	0	0	0	0	0
Betsi Cadwaladr University Local Health Board	17	4	0	15	12	6	3	2	4	0
Birmingham Community Healthcare NHS Trust	2	0	0	0	1	0	0	0	0	0
Birmingham Women's Healthcare NHS Trust	1	1	0	1	0	0	0	0	0	0
Blackpool, Fylde and Wyre Hospitals NHS Foundation Trust	2	2	0	1	2	4	4	0	4	0
BMI Healthcare	52	36	3	46	2	2	0	0	0	0

Bradford District Care Trust	5	0	0	2	0	0	0	0	0	0
Bradford Teaching Hospitals NHS Foundation Trust	2	1	1	1	3	3	2	1	2	1
Brighton and Sussex University Hospitals NHS Trust	3	3	0	2	4	4	3	1	4	0
Buckinghamshire Healthcare NHS Trust	9	2	7	0	5	4	4	0	4	0
BUPA Cromwell Hospital	1	1	0	1	1	1	0	0	0	0
Burton Hospitals NHS Foundation Trust	1	1	0	0	5	5	2	0	5	0
Calderdale & Huddersfield NHS Foundation Trust	2	2	0	1	4	2	2	0	2	0
Cambridge University Hospitals NHS Foundation Trust	1	1	0	0	3	3	3	0	3	0
Cambridgeshire Community Services NHS Trust	4	0	4	4	0	0	0	0	0	0
Cardiff and Vale University Health Board	7	7	0	5	8	8	5	1	7	1
Care UK	4	3	0	2	0	0	0	0	0	0
Central and North West London NHS Foundation Trust	1	0	0	1	0	0	0	0	0	0
Central Lancashire Primary Care Trust	1	0	0	1	0	0	0	0	0	0
Central London Community Healthcare NHS Trust	1	0	0	0	0	0	0	0	0	0
Central Manchester University Hospitals NHS Foundation Trust	4	4	0	3	5	5	2	2	2	3
Chelsea & Westminster Healthcare NHS Trust	1	0	0	0	2	2	0	0	0	0
Chesterfield Royal Hospital NHS Foundation Trust	1	1	0	0	3	3	3	0	3	0
Circle Health Limited	1	1	0	1	0	0	0	0	0	0
City Hospitals Sunderland NHS Foundation Trust	2	2	0	3	8	8	8	0	8	0
Clatterbridge Centre for Oncology NHS Trust	1	1	0	1	1	1	1	0	1	0
Colchester Hospital University NHS Foundation Trust	2	0	0	1	4	3	0	0	0	0
Countess of Chester Hospital NHS Foundation Trust	2	1	0	0	2	2	2	0	2	0
County Durham and Darlington NHS Foundation Trust	8	6	0	5	4	4	3	1	2	0
Croydon Health Services NHS Trust	1	1	0	0	2	1	0	0	1	0
Cumbria Partnership NHS Foundation Trust	9	0	9	9	0	0	0	0	0	0
Cwm Taf Local Health Board	5	5	0	3	4	3	3	0	3	0
Dartford & Gravesham NHS Trust	1	0	0	0	5	4	3	0	2	0
Derby Hospitals NHS Foundation Trust	1	1	0	1	9	9	9	0	9	0
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	5	3	0	3	5	5	5	0	3	0
Dorset County Hospital NHS Foundation Trust	1	1	0	1	1	1	1	0	1	0
Dorset Healthcare University NHS Foundation Trust	11	0	0	0	0	0	0	0	0	0
Ealing Hospital NHS Trust	1	1	0	0	3	2	2	0	2	0
Ealing Primary Care Trust	2	0	0	1	0	0	0	0	0	0
East & North Hertfordshire NHS Trust	3	2	0	0	5	5	4	1	4	1

Trust Name	Number of hospitals	Number of completed organisational questionnaires received	Number of hospitals returning other organisational data*	Number of hospitals that returned spreadsheet data or informed of null-return	Number of resuscitation forms received	Number of cases identified for inclusion	Questionnaires returned	Valid reason for non-return of questionnaire	Case notes received	Valid reason for non-return of case notes
East Cheshire NHS Trust	2	0	0	3	7	7	6	1	7	0
East Kent Hospitals University NHS Foundation Trust	5	3	2	2	14	14	9	1	3	0
East Kent Medical Services	1	1	0	1	0	0	0	0	0	0
East Lancashire Hospitals NHS Trust	3	3	0	2	1	2	2	0	2	0
East Riding of Yorkshire Primary Care Trust	4	0	0	0	0	0	0	0	0	0
East Sussex Healthcare NHS Trust	6	5	0	0	4	4	4	0	4	0
Enfield Primary Care Trust	1	0	0	1	0	0	0	0	0	0
Epsom and St Helier University Hospitals NHS Trust	5	5	0	6	6	6	4	0	6	0
Fairfield Independent Hospital	1	1	0	1	0	0	0	0	0	0
Frimley Park Hospitals NHS Trust	1	1	0	0	2	2	2	0	2	0
Gateshead Health NHS Foundation Trust	2	2	0	1	4	4	4	0	3	0
George Eliot Hospital NHS Trust	1	0	0	1	0	0	0	0	0	0
Gloucestershire Hospitals NHS Foundation Trust	2	2	0	0	8	10	7	0	3	0
Great Western Hospitals NHS Foundation Trust	1	1	0	1	2	2	2	0	2	0
Guy's & St Thomas' NHS Foundation Trust	3	2	0	0	0	0	0	0	0	0
Hampshire Hospitals NHS Foundation Trust	2	2	0	2	2	2	2	0	2	0
Harrogate and District NHS Foundation Trust	3	2	0	0	4	4	4	0	3	0
HCA International	7	2	0	6	0	0	0	0	0	0
Health & Social Services, States of Guernsey	2	2	0	1	3	3	1	0	1	0
Health & Surgical Holdings	1	1	0	0	0	0	0	0	0	0
Heart of England NHS Foundation Trust	3	3	0	0	0	14	4	2	0	0
Heatherwood & Wexham Park Hospitals NHS Foundation Trust	4	0	0	3	6	7	3	4	3	4
Herefordshire Primary Care Trust	5	0	0	0	1	0	0	0	0	0

Hertfordshire Community NHS Trust	5	0	0	0	0	0	0	0	0	0
Hillingdon Hospital NHS Trust	1	1	0	0	5	5	4	0	1	0
Hinchingbrooke Health Care NHS Trust	1	1	0	0	1	1	0	1	1	0
Homerton University Hospital NHS Foundation Trust	1	0	0	1	3	3	1	2	1	2
Hospital of St John and St Elizabeth	1	1	0	1	0	0	0	0	0	0
Hull and East Yorkshire Hospitals NHS Trust	2	2	0	0	7	7	7	0	7	0
Hywel Dda Local Health Board	10	9	1	0	6	6	6	0	6	0
Imperial College Healthcare NHS Trust	5	5	0	2	11	10	8	0	8	2
Ipswich Hospital NHS Trust	1	1	0	0	5	5	5	0	5	0
Isle of Man Department of Health & Social Security	2	1	1	2	0	0	0	0	0	0
Isle of Wight NHS Primary Care Trust	1	1	0	0	4	0	0	0	0	0
James Paget Healthcare NHS Trust	2	2	0	1	2	2	2	0	2	0
Kent Community Health NHS Trust	12	0	6	12	0	0	0	0	0	0
Kettering General Hospital NHS Trust	1	1	0	0	4	7	7	0	7	0
King Edward VII's Hospital Sister Agnes	1	1	0	1	0	0	0	0	0	0
King's College Hospital NHS Foundation Trust	1	1	0	0	12	11	8	1	11	0
Kingston Hospital NHS Trust	1	1	0	0	4	4	3	1	3	1
Lancashire Teaching Hospitals NHS Foundation Trust	2	0	0	2	2	8	1	0	1	0
Leeds Teaching Hospitals NHS Trust (The)	6	6	0	5	13	11	5	1	4	1
Lewisham Hospital NHS Trust	1	1	0	1	5	3	3	0	3	0
Liverpool Community Health	1	0	1	1	0	0	0	0	0	0
Liverpool Heart and Chest Hospital NHS Trust	1	1	0	0	3	3	3	0	3	0
Liverpool Women's NHS Foundation Trust	1	0	0	0	0	0	0	0	0	0
London Clinic	1	1	0	1	0	0	0	0	0	0
Luton and Dunstable Hospital NHS Foundation Trust	1	1	0	1	2	2	2	0	2	0
Maidstone and Tunbridge Wells NHS Trust	2	1	0	3	11	10	9	0	10	0
Medway NHS Foundation Trust	1	1	0	0	6	6	6	0	6	0
Mid Cheshire Hospitals NHS Foundation Trust	1	1	0	1	4	4	4	0	3	0
Mid Staffordshire NHS Foundation Trust	2	2	0	2	2	2	2	0	2	0
Mid Yorkshire Hospitals NHS Trust	5	5	0	7	18	0	0	0	0	0
Mid-Essex Hospital Services NHS Trust	1	1	0	1	0	0	0	0	0	0
Milton Keynes Hospital NHS Foundation Trust	1	1	0	1	5	0	0	0	0	0
Milton Keynes Primary Care Trust	1	0	0	0	0	0	0	0	0	0
Moorfields Eye Hospital NHS Foundation Trust	1	1	0	1	0	0	0	0	0	0
New Victoria Hospital	1	1	0	1	0	0	0	0	0	0

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Newcastle upon Tyne Hospitals NHS Foundation Trust	3	3	0	1	8	6	6	0	6	0
Newham University Hospital NHS Trust	1	1	0	0	6	6	1	0	1	0
NHS Barnet	2	0	0	2	0	0	0	0	0	0
NHS Bath & North East Somerset	2	0	0	0	0	0	0	0	0	0
NHS Bedfordshire	1	0	0	0	0	0	0	0	0	0
NHS Camden	1	0	0	0	0	0	0	0	0	0
NHS Cornwall and Isles of Scilly	16	0	0	0	0	0	0	0	0	0
NHS Derbyshire County	12	0	0	0	0	0	0	0	0	0
NHS Gloucestershire - Gloucestershire Care Services	11	0	11	8	0	0	0	0	0	0
NHS Great Yarmouth and Waveney	4	0	4	4	0	0	0	0	0	0
NHS Kingston	2	0	2	2	0	0	0	0	0	0
NHS Kirklees	1	0	0	0	0	0	0	0	0	0
NHS Leicestershire County and Rutland	4	0	0	0	0	0	0	0	0	0
NHS Lincolnshire	4	0	1	3	0	0	0	0	0	0
NHS Manchester	1	0	1	1	0	0	0	0	0	0
NHS Mid Essex	3	0	0	0	0	0	0	0	0	0
NHS Norfolk - Norfolk Community Health & Care	1	0	0	0	0	0	0	0	0	0
NHS North Yorkshire and York	9	0	0	9	0	0	0	0	0	0
NHS Nottinghamshire County	3	0	0	0	0	0	0	0	0	0
NHS Richmond	1	0	0	1	0	0	0	0	0	0
NHS South West Essex	4	0	1	0	0	0	0	0	0	0
NHS South Yorkshire and Bassetlaw	3	0	0	0	0	0	0	0	0	0
NHS Surrey	12	0	0	0	1	0	0	0	0	0
NHS West Essex	4	0	4	0	0	0	0	0	0	0

NHS West Sussex	5	0	0	0	0	0	0	0	0	0
NHS Wiltshire	3	0	0	3	0	0	0	0	0	0
NHS Worcestershire	5	0	0	1	0	0	0	0	0	0
Norfolk & Norwich University Hospital NHS Trust	2	0	0	3	4	4	3	0	2	0
North Bristol NHS Trust	2	2	0	2	4	4	4	0	4	0
North Cumbria University Hospitals NHS Trust	2	2	0	0	8	0	0	0	0	0
North Middlesex University Hospital NHS Trust	1	1	0	1	0	0	0	0	0	0
North Tees and Hartlepool NHS Foundation Trust	2	2	0	0	5	5	5	0	5	0
North West London Hospitals NHS Trust	2	2	0	2	8	4	4	0	4	0
Northampton General Hospital NHS Trust	1	1	0	0	5	5	5	0	5	0
Northamptonshire Teaching Primary Care Trust	4	0	0	0	0	0	0	0	0	0
Northern Devon Healthcare NHS Trust	18	1	17	16	3	3	3	0	3	0
Northern Health & Social CareTrust	4	2	2	0	7	7	5	2	4	0
Northern Lincolnshire & Goole Hospitals NHS Foundation Trust	3	2	1	0	4	6	4	0	2	0
Northumbria Healthcare NHS Foundation Trust	9	9	0	1	3	2	2	0	2	0
Nottingham University Hospitals NHS Trust	2	2	0	0	8	7	7	0	7	0
Nucleus Healthcare	1	1	0	1	0	0	0	0	0	0
Nuffield Health	29	22	0	20	1	0	0	0	0	0
Outer North East London Community Services	1	0	0	0	0	0	0	0	0	0
Oxford University Hospitals NHS Trust	6	1	0	4	10	10	8	1	9	0
Oxfordshire Primary Care Trust	7	0	0	1	0	0	0	0	0	0
Papworth Hospital NHS Foundation Trust	1	1	0	1	3	2	2	0	2	0
Pennine Acute Hospitals NHS Trust (The)	4	4	0	2	11	10	7	0	7	0
Peterborough & Stamford Hospitals NHS Foundation Trust	2	2	0	2	3	3	1	2	0	3
Plymouth Hospitals NHS Trust	2	2	0	0	8	0	0	0	0	0
Poole Hospital NHS Foundation Trust	1	1	0	0	2	2	2	0	0	0
Portsmouth Hospitals NHS Trust	1	1	0	0	6	6	5	1	6	0
Powys Teaching Local Health Board	10	0	10	10	0	0	0	0	0	0
Princess Alexandra Hospital NHS Trust	3	1	2	0	2	2	2	0	2	0
Queen Victoria Hospital NHS Foundation Trust	1	1	0	1	1	1	1	0	1	0
Ramsay Health Care UK	25	17	0	23	1	1	1	0	1	0
Robert Jones and Agnes Hunt Orthopaedic Hospital NHS Foundation Trust	1	1	0	1	0	0	0	0	0	0
Royal Berkshire NHS Foundation Trust	1	1	0	0	3	3	3	0	3	0

Trust Name	Number of hospitals	Number of completed organisational questionnaires received	Number of hospitals returning other organisational data*	Number of hospitals that returned spreadsheet data or informed of null-return	Number of resuscitation forms received	Number of cases identified for inclusion	Questionnaires returned	Valid reason for non-return of questionnaire	Case notes received	Valid reason for non-return of case notes
Royal Bolton Hospital NHS Foundation Trust	1	1	0	1	2	2	2	0	2	0
Royal Bournemouth and Christchurch Hospitals NHS Trust	2	2	0	1	6	6	6	0	6	0
Royal Brompton and Harefield NHS Foundation Trust	2	2	0	2	3	3	3	0	3	0
Royal Cornwall Hospitals NHS Trust	3	3	0	5	4	4	4	0	4	0
Royal Devon and Exeter NHS Foundation Trust	1	1	0	0	3	3	3	0	3	0
Royal Free Hampstead NHS Trust	2	2	0	3	9	9	8	1	8	1
Royal Liverpool & Broadgreen University Hospitals NHS Trust	1	0	0	0	3	3	3	0	3	0
Royal Marsden NHS Foundation Trust (The)	2	2	0	0	1	0	0	0	0	0
Royal National Hospital for Rheumatic Diseases										
NHS Foundation Trust	1	0	0	1	0	0	0	0	0	0
Royal National Orthopaedic Hospital NHS Trust	1	1	0	1	0	0	0	0	0	0
Royal Orthopaedic Hospital NHS Foundation Trust	1	1	0	1	0	0	0	0	0	0
Royal Surrey County Hospital NHS Trust	1	1	0	0	3	2	2	0	2	0
Royal United Hospital Bath NHS Trust	1	1	0	1	4	4	3	1	3	1
Royal Wolverhampton Hospitals NHS Trust (The)	1	0	0	0	6	0	0	0	0	0
Salford Royal Hospitals NHS Foundation Trust	1	1	0	0	0	1	1	0	1	0
Salisbury NHS FoundationTrust	1	1	0	0	2	2	2	0	2	0
Sandwell and West Birmingham Hospitals NHS Trust	3	3	0	5	3	3	3	0	3	0
Scarborough and North East Yorkshire Health Care NHS Trust	2	2	0	1	6	6	5	0	3	0

SEQOL(Care and Support Ptnrship Community Interest Company	1	0	1	0	0	0	0	0	0	0
Sheffield Teaching Hospitals NHS Foundation Trust	5	5	0	3	10	9	9	0	9	0
Sherwood Forest Hospitals NHS Foundation Trust	2	2	0	2	4	3	3	0	3	0
Shrewsbury and Telford Hospitals NHS Trust	2	2	0	0	14	14	12	2	14	0
Shropshire County Primary Care Trust	4	0	0	0	0	0	0	0	0	0
South Devon Healthcare NHS Foundation Trust	1	1	0	1	1	1	1	0	1	0
South Eastern Health & Social Care Trust	4	4	0	7	5	5	4	1	4	0
South London Healthcare NHS Trust	4	2	2	0	16	14	9	1	9	0
South Staffordshire Primary Care Trust	3	0	0	0	0	0	0	0	0	0
South Tees Hospitals NHS Foundation Trust	7	2	0	2	0	5	5	0	5	0
South Tyneside NHS Foundation Trust	3	1	2	2	6	6	6	0	3	0
South Warwickshire NHS Foundation Trust	6	1	1	1	5	5	5	0	5	0
Southampton University Hospitals NHS Trust	4	4	0	0	2	2	1	0	0	0
Southend University Hospital NHS Foundation Trust	1	1	0	1	6	6	4	0	3	0
Southern Health & Social Care Trust	7	3	1	0	4	0	0	0	0	0
Southern Health NHS Foundation Trust	11	1	10	11	0	0	0	0	0	0
Southport and Ormskirk Hospitals NHS Trust	2	2	0	0	4	5	4	1	4	1
Spire Healthcare	33	29	0	32	0	0	0	0	0	0
St Anthony's Hospital	1	1	0	0	1	1	0	0	0	0
St George's Healthcare NHS Trust	1	1	0	0	6	8	5	0	4	0
St Helens and Knowsley Teaching Hospitals NHS Trust	2	2	0	3	5	5	5	0	5	0
St Joseph's Hospital	1	1	0	1	0	0	0	0	0	0
Staffordshire & Stoke on Trent Partnership NHS Trust	2	0	0	0	0	0	0	0	0	0
States of Jersey Health & Social Services	1	0	0	1	0	0	0	0	0	0
Stockport NHS Foundation Trust	1	1	0	0	2	3	3	0	1	0
Suffolk Primary Care Trust	5	0	5	5	0	0	0	0	0	0
Surrey & Sussex Healthcare NHS Trust	1	0	0	0	9	8	6	0	5	0
Tameside & Glossop Primary Care Trust	1	0	1	1	0	0	0	0	0	0
Tameside Hospital NHS Foundation Trust	1	1	0	0	4	4	3	0	3	0
Taunton & Somerset NHS Foundation Trust	1	1	0	0	5	5	5	0	5	0
The Christie NHS Foundation Trust	1	0	0	1	0	0	0	0	0	0
The Dudley Group NHS Foundation Trust	1	1	0	0	3	3	3	0	3	0
The Horder Centre	1	1	0	1	0	0	0	0	0	0
The Hospital Management Trust	3	3	0	2	1	1	0	0	0	0
The Queen Elizabeth Hospital King's Lynn NHS Trust	1	1	0	0	5	5	4	1	4	0

Trust Name	Number of hospitals	Number of completed organisational questionnaires received	Number of hospitals returning other organisational data*	Number of hospitals that returned spreadsheet data or informed of null-return	Number of resuscitation forms received	Number of cases identified for inclusion	Questionnaires returned	Valid reason for non-return of questionnaire	Case notes received	Valid reason for non-return of case notes
The Rotherham NHS Foundation Trust	1	1	0	1	1	1	1	0	1	0
The Walton Centre NHS Foundation Trust	1	1	0	1	0	0	0	0	0	0
Torbay Care Trust	11	0	0	9	0	0	0	0	0	0
Trafford Healthcare NHS Trust	3	0	0	3	2	2	2	0	2	0
UK Specialist Hospitals Ltd	1	0	0	0	0	0	0	0	0	0
Ulster Independent Clinic	1	0	1	1	0	0	0	0	0	0
United Lincolnshire Hospitals NHS Trust	4	4	0	1	10	10	10	0	10	0
Univ. Hospital of South Manchester NHS Foundation Trust	1	1	0	1	3	3	3	0	3	0
University College London Hospitals NHS Foundation Trust	5	3	2	8	3	4	3	0	3	0
University Hospital Birmingham NHS Foundation Trust	2	2	0	2	4	5	5	0	5	0
University Hospitals Coventry and Warwickshire NHS Trust	2	2	0	3	15	16	16	0	16	0
University Hospitals of Bristol NHS Foundation Trust	6	6	0	5	4	4	4	0	4	0
University Hospitals of Leicester NHS Trust	3	3	0	0	6	6	6	0	6	0
University Hospitals of Morecambe Bay NHS Trust	3	3	0	1	2	5	4	1	4	1
Velindre NHS Trust	1	1	0	1	0	0	0	0	0	0
Walsall Hospitals NHS Trust	1	0	0	0	4	0	0	0	0	0
Warrington & Halton Hospitals NHS Foundation Trust	2	2	0	0	2	0	0	0	0	0
Wells Hospital and Hospice Charitable Trust	1	0	0	0	0	0	0	0	0	0
West Hertfordshire Hospitals NHS Trust	2	2	0	0	0	0	0	0	0	0

West Middlesex University Hospital NHS Trust	1	1	0	0	5	9	4	0	3	1
West Suffolk NHS Foundation Trust	1	1	0	0	2	2	2	0	2	0
Western Health & Social Care Trust	4	4	0	4	4	4	4	1	2	0
Western Sussex Hospitals NHS Trust	3	3	0	1	14	13	12	0	12	0
Weston Area Health Trust	1	1	0	0	2	3	2	1	2	1
Whipps Cross University Hospital NHS Trust	1	1	0	0	7	7	3	0	1	0
Whittington Health	1	1	0	1	1	1	1	0	1	0
Wirral University Teaching Hospital NHS Foundation Trust	4	2	2	0	0	0	0	0	0	0
Worcestershire Acute Hospitals	3	3	0	1	12	11	9	0	8	0
Wrightington, Wigan & Leigh NHS Foundation Trust	3	3	0	5	7	7	4	3	7	0
Wye Valley NHS Trust	1	1	0	1	0	1	1	0	1	0
Yeovil District Hospital NHS Foundation Trust	1	1	0	0	1	1	1	0	1	0
York Teaching Hospital NHS Foundation Trust	1	1	0	1	4	4	4	0	4	0

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