



Establishing a standard crash call number in  
hospitals in England and Wales  
Feasibility study report





## **Purpose of this document**

The purpose of this report is to provide an overview of the feasibility study conducted by the NPSA into standardising the crash call number in hospitals.

The report is also available electronically on the NPSA website at <http://www.npsa.nhs.uk> and the NHSIA website at <http://www.nhsia.nhs.uk>, together with the results of a survey conducted with acute trusts in England to get a clearer picture of the issues involved in moving to a standard number.

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## 1 Context

The NPSA was asked to carry out a feasibility study of standardising the crash call number\* following the publication in July 2002 by the Department of Health (DoH) and the Cabinet Office, of a report *"Making a Difference: Reducing Burdens in Hospital"*. The project was 1 of 40 focused on hospitals, making up the second joint programme of the Cabinet Office (Regulatory Impact Unit) and Department of Health<sup>1</sup>. The selection of projects was made after visits to 37 hospitals, which included interviews with 270 front-line staff. The overall purpose of the schemes was "reducing burdens on front-line staff", thereby enabling them to focus on providing better patient care.

Standardising the crash call or cardiac arrest call number was considered important because it was known that many numbers were being used for that purpose within the NHS. Clinicians who move between hospitals could waste time by using the incorrect number and patient safety could be put at risk by any delay in the team being called.

## 2 Terms of reference

The projected outcome of the study was "one telephone number for cardiac arrests across all hospitals".

The specific remit was to carry out a feasibility study to identify:

- the compatibility between the wide range of switchboards and telephone equipment used in the service;
- the feasibility of introducing such a change;
- the best way of implementing a standard number.

This report applies only to acute trusts. Mental health trusts also need systems for summoning help for cardiac arrests. As part of the NPSA's *Creating a Safer Psychiatric Ward Environment* initiative, we will be assessing capability and capacity in respect of cardiac arrests and other events that may necessitate summoning help. We will report on this in the latter part of 2004.

The remit of the NPSA relates to England and Wales; colleagues in Scotland and Northern Ireland have been alerted to the project and are assessing the range of numbers in use in their hospitals and will consider the conclusions of this feasibility study.

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\* A crash call number is the number dialled to summon the emergency team following a cardiac arrest in hospital.

The project was carried out in conjunction with the NHS Information Authority (NHSIA).

### 3 A profile of cardiac arrests and relevant wider policy issues

In the UK each year:

- someone has a heart attack every two minutes;
- 140,000 people die of a heart attack – 75% of these deaths occur at home<sup>2</sup>.

A range of international studies, including some focused on the UK, have shown that after a cardiac arrest in hospital, survival rates to hospital discharge have remained unchanged at around 14-15% for the last 15 years<sup>3 4 5</sup>.

This project had a clear, narrow focus. However it linked into larger, longer term areas of service development directed at improving the care of patients with heart problems and of other groups of patients where resuscitation issues arise. The principal of these are the National Service Framework for Coronary Heart Disease<sup>6</sup> and the plan for improving Critical Care Services<sup>7</sup> as well as the training programmes of the Resuscitation Council<sup>8</sup>.

### 4 Review of evidence that use of different telephone numbers for cardiac arrests is a patient risk issue

#### 4.1 Conclusions drawn from a review of the literature

- 1 There is very little literature on the role of the telephone in improving cardiac arrest response systems and almost all of it relates to how ambulance services have been improved, rather than internal hospital systems. No research reports were found that established any evidence of higher morbidity or mortality due to hospitals using a variety of different numbers for cardiac arrest calls.
- 2 Four published short articles were located which focused on cardiac arrest telephone numbers in hospital; all advocated a standard number being adopted<sup>9 10 11 12</sup>. Two more recent, unpublished reviews of the range of telephone numbers in use in England and Wales also concluded that a standardised number should be introduced<sup>13 14</sup>. A larger literature was found that indicated that the majority of in-hospital arrests were predictable and avoidable and their occurrence was due to multiple management system failures. The literature also indicated that if the number of cardiac arrests in hospitals was

reduced, a substantial reduction in morbidity and mortality could be achieved<sup>15 16 17 18</sup>. The quality of this research has been assessed and recognised as providing “good quality – level 2 evidence”. The reduction of cardiac arrests in hospital would also reduce demand for critical care facilities and thereby lead to a reduction in expenditure<sup>19</sup>.

- 3 The key problems the studies identified that led to the high level of cardiac arrests were:
  - delays/errors in diagnosis;
  - inadequate interpretation of investigations;
  - incomplete treatment;
  - inexperienced doctors;
  - management in inappropriate clinical areas.
- 4 Some limited evidence was also identified that indicated that:
  - more arrests occur at weekends than during the week;
  - pro-rata five times as many arrests occur on wards as in critical care units;
  - twelve times more arrests than the average occur in patients who are outliers, i.e. not in their specialty's ward.
- 5 The literature indicated a range of views about the strength of the evidence base on how effective various types of clinical and organisational interventions have been in reducing the level of avoidable cardiac arrests. Larger multi-centre, randomised controlled studies are planned which should provide more conclusive evidence of the effectiveness of different interventions<sup>20</sup>.

#### 4.2 The views of key professional groups

- 1 Since 1989 it has been Department of Health policy guidance (and also that of the Welsh Office/Welsh Assembly Government) that 222 or 2222 should be the standard number for cardiac arrests. This was confirmed in Health Building Note 48 issued in 1997<sup>21</sup>.
- 2 The Resuscitation Council has also advocated the adoption of the standard number for several years, as the critical first step in a sequence of four, to respond effectively to a cardiac arrest in hospital<sup>8</sup>. In 1990 the American Heart Association suggested the “Chain of Survival” concept with four linked steps to manage cardiac arrests:
  - early access (contacting the crash team);
  - cardio-pulmonary resuscitation (CPR);

- defibrillation;
- advanced care.

In the UK the Resuscitation Council has adopted this four stage approach for several years and in their training material the first of the four steps is illustrated as a telephone – highlighting the significance attached to an efficient contact system within hospitals.

- 3 Representatives of key professional groups and relevant DoH and Welsh Assembly Government policy advisers consulted as part of this study, were all strongly in favour of the adoption of a standard number, as the existence of different numbers was regarded as:
  - a cause of uncertainty and delay in contacting the switchboard;
  - a cause of delay in starting the four step “Chain of Survival” for cardiac arrest cases.
- 4 Further reasons were given for this issue now presenting potentially more serious clinical risks than in the past, due to:
  - greater mobility of staff;
  - higher reliance on agency staff;
  - an increase in the number of trusts with more than one number in use due to mergers – i.e. more multi-site hospital trusts.
- 5 Professionals felt that a standard number should be adopted for NHS emergency calls for the same reason that a standard number exists for public emergency calls (999) – to avoid confusion and ensure the number is easily recalled in an urgent situation.
- 6 At a workshop held in January 2003, representatives of various Royal Colleges and other relevant professional groups endorsed the adoption of a standard cardiac arrest number by acute hospitals (the groups present were the College of Anaesthetists, the Critical Care Nursing Association, the Intensive Care Society, the College of Physicians, the Accident & Emergency Medicine Society, the Resuscitation Council and the Royal College of Nursing).
- 7 However, these key professional groups indicated that if significant conversion costs were involved, then a number of other initiatives associated with the prevention and management of cardiac arrests would have a much higher priority for investment based on any normal set of cost/ benefit criteria.



- 8 There was strong support for a more coordinated approach to reduce the number of cardiac arrests in hospital. It was thought that this could be done by more systematic adoption of best practice guidance in respect of 'do not attempt to resuscitate' (DNAR) orders, as well as by hospitals utilising early warning scoring systems and organisational arrangements such as critical care outreach teams.

#### **4.3 The views of front line staff directly involved in operating the crash call system – switchboard and resuscitation officers**

- 1 A survey carried out by Worthing and Southlands Trust in 2002 found that only 19% of switchboard managers who responded knew of the existence of DoH guidance advocating the standardised cardiac arrest number (14). The survey also showed that while 99% of resuscitation officers indicated that they supported a standardised number, only 42% of switchboard operators thought it was necessary/appropriate.
- 2 At a workshop held in February 2003 as part of this feasibility study, switchboard managers endorsed the introduction of a standard number as a desirable goal. They also said that the recommended standard number should be more actively promoted. However the switchboard managers had reservations about the implementation arrangements for such a change – in particular that it would not be properly funded. Another concern was the many other demands on local switchboard managers' time, which would limit the local capacity available to organise effectively changes to their internal extension system associated with changing the crash call number. Additionally the changes that would be required to various types of documentation, signs etc, and the awareness raising/training of staff needed to be recognised as requiring coordinated action from a range of managers in a trust.

#### **5 The range of numbers used for cardiac arrests and other emergencies (222/2222 and of other numbers)**

- 1 A survey reported in the Lancet in 1990<sup>9</sup> indicated that some 43% of acute hospitals in the UK used 222 or 2222 as the crash call number. Three surveys carried out between 2000 and 2002<sup>13 14 22</sup>, including that of the NPSA as part of the feasibility study, indicated that the use of 222 or 2222 had been gradually increasing over the last decade.

The following table shows the figures revealed by the three most recent surveys:

| Survey                                | Hull <sup>13</sup>                       | Worthing <sup>14</sup>   | NHS/ NHSIA survey <sup>22</sup>   |
|---------------------------------------|--|--|---|
| Number of Acute Hospitals             | 198 – Hospitals in England               | 192 – Hospitals in Eng and Wales                                 | 173 trusts in England NB trusts and not hospitals were surveyed                           |
| Date carried out                      | 2000                                     | 2002   | 2002  |
| Number of Responses and as % of total | 139 – 70%                                | 192 – 90% from Resuscitation Officers, 72% from S/board Managers | 87% trusts (150 of 173 trusts) equivalent to 219 hospitals as some trusts were multi-site |
| 2222                                  | 38 -27%                                  | 56 -29%  | 75 -34%   |
| 222                                   | 21 -15%                                  | 40 -21%  | 39 -18%   |
| 333                                   | 24 -17%                                  | 31 -16%  | 33 -15%   |
| 3333                                  | 13 -9%                                   | 25 -13%  | 24 -11%   |
| Other numbers used and %              | 18 numbers used in 43 (30%) of hospitals | 20 numbers used in 40 (21%) of hospitals                         | 23 numbers used in 48 (22%) of hospitals  |

By 2002 85% of all acute sites in Wales used 222 or 2222 for cardiac arrests and there were clear plans in the Principality to achieve 100% compliance – thus they did not participate in the NPSA survey. A recent review by Health Solutions Wales has found that all hospitals providing acute services in Wales now use 222 or 2222 for crash calls.

The December 2002 NPSA survey showed that besides 222 and 2222, there were 25 other numbers in use in NHS acute hospitals in England, for contacting the switchboard when a cardiac arrest occurred. (Copies of this survey are available from the NPSA – [www.npsa.nhs.uk/surveycardiacarrestnumbers](http://www.npsa.nhs.uk/surveycardiacarrestnumbers) or as hard copies by phoning 0207 927 9500.)

74% of acute hospitals have a separate number for cardiac arrests from those used for other emergencies <sup>13</sup>. Evidence was found of an

even greater diversity of numbers being used in hospitals for emergencies other than cardiac arrests<sup>13 14</sup>. In Wales less variation was found, with most acute sites using 333, 3333 or 999 for other emergencies. It is planned to standardise on 3333 for other emergencies in Wales.

## 6 The implementation issues related to introducing a standard number

The following section is based on information from the NPSA survey of acute trusts in England carried out in December 2002<sup>22</sup>.

### 6.1 Issues involved in converting to a single standard number – 2222

- 1 The NPSA survey was based on the sponsors' brief of testing the feasibility and implementation issues related to standardising on "one telephone number for cardiac arrests across all hospitals". Given the evidence from the surveys carried out in 2000 and 2002 (see table above) that 2222 was the most common number in use, it was decided to identify the implications of standardising on this. Additionally, this was regarded as the most reliable option to test, as 57% of acute hospitals had four digit systems and the trend to larger exchanges made this likely to become even more the norm.
- 2 Based on the returns to the NPSA survey, a substantial proportion of hospitals have plans to replace their switchboards within the next few years. This illustrated that there should be substantial early opportunities to convert to the recommended number, as part of major switchboard changes being planned.
- 3 These results indicated that the total conversion costs for hospitals in this survey to adopt 2222 would be £745,000. This would equate to a conversion cost of approximately £5,200 per site for the 144 hospitals that responded and were not using 2222 already (These figures would need to be uplifted to reflect the costs for the non-responding hospitals to get an overall conversion cost for English acute hospitals).
- 4 The technical telephony costs of standardisation were reported to be relatively modest at £151,000, i.e. 20% of the total costs. Indeed 20% (29/144) of hospitals not using 2222, reported that there would be no financial costs for changing their internal or extension system/plan to convert to 2222. The survey replies also indicated that the telephony changes would be straightforward to introduce for the majority of other hospitals, but 16% (23/144) hospitals needing to convert, had more complex technical changes to manage.

- 5 71% (102/144) hospitals reported that there would be cost implications for changing documentation, e.g. headed paper, reprinting directories, fire signs as well as publicity and training costs. These areas represent the bulk of the conversion costs as well as the management overhead that would be involved in introducing the change. The changes related to changing documentation and signs were £438,000, 58% of the total projected cost. Approximately £103,000 was estimated as necessary for training/awareness raising of the number change, that is 14% of the total cost.
- 6 The NPSA survey showed that some 63% of the estimated conversion costs related to 11% (16/144) of the hospitals – a cost per site of over £29,000. It was decided to seek further information from these sites through telephone interviews with the switchboard managers. These discussions indicated that on closer consideration of the various costs, the estimates could be reduced by about a third. However these discussions also indicated that it was very likely that some other trusts in the lower cost groups, had underestimated their conversion costs – especially with regard to documentation changes.

## 6.2 An assessment of whether 222 as well as 2222 should continue to be a recommended cardiac arrest number

- 1 Thirty nine of the responding hospitals (18%) were using 222, but the conversion costs of this group totalled £295,000, i.e. 39% of the total. The discussions with individual trusts therefore also focused on the rationale for those hospitals, already using the second currently recommended number (222), having to convert. This issue was also discussed at the switchboard managers' workshop.
- 2 A subsequent assessment was carried out with the NHSIA and advice was given by the NPSA's specialist risk advisers (DNV Consulting). The cost implications and relative risk reduction were examined, looking at the option of 222 remaining as a recommended number; as opposed to only 2222 being designated, as had been the basis of the survey. It was concluded that a single number would be the least confusing, i.e. create the lowest risk situation and that this should be 2222 for the reasons set out in **6.1.1** above. Virtually all hospitals currently using 222 can for the time being utilise the digital translation\* facility of their telephone systems (so that 2222 can be used). The survey showed 96% (138/144) of hospitals not using 2222 had such a translation facility.

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\* Digit translation is the ability of the telephone system to route intelligently different digit strings to the same location – e.g. someone dialling 333 is routed to 2222.

- 3 The follow up telephone discussions with trusts that had reported high conversion costs, indicated that their costs could be reduced by approximately 30%, reducing the cost per site to under £4,000. However it appeared likely that the costs quoted by some trusts were under estimates.

### **6.3 Standardisation costs for sites not currently using 222 or 2222 as crash call numbers**

#### **There were found to be 3 groupings:**

- 1 The NPSA survey showed there was a group of hospitals – 43 of the 105 sites (i.e. 41% of the total) not already using 222 or 2222 – that could convert at under £1,000 per site. By this group converting, the standardisation rate would increase to 72%. This would in many “management of change” scenarios be regarded as creating a critical mass that would lead to an accelerated pace of uptake amongst most of the remaining groups.
- 2 There was a further group of hospitals 46 (44%) of the 105 non-standard sites, which had estimated their conversion costs at between £1,000-£5,000. If all these sites converted, the level of standardisation would reach 93% of all acute sites in England.
- 3 The remaining 16 acute hospitals (15%) in England not using either 222 or 2222 would face higher costs per site as well as more complex technical changes. Conversion costs for this group accounted for around 69% of the total. Eight sites accounted for over half of the total projected conversion cost of £465,000.

## **7 Recommended implementation arrangements**

- 1 These recommendations are targeted at the English NHS; the compliance already achieved in Wales indicates that advice from this study is unnecessary. The Welsh approach has highlighted some key success factors that could be usefully adopted in England. The Welsh Common Services Agency took a proactive approach over several years to ensure that the recommended numbers were well known by key staff in hospitals. They also ensured that when major changes were being made to switchboards, the opportunity was taken to adopt the standard numbers.

### **7.1 Identifying a lead organisation**

- 1 For the NHS in England it has been concluded that it is important to identify an organisation that will take on an equivalent leadership role as has existed in Wales for several years. Traditionally the NHS Estates

Branch of the DoH issued Building Notes that gave advice on telephony issues. However it has been staff of the NHSIA in England who have advised trusts on technical issues relating to replacing switchboard systems. With the trends in technology of voice and data systems merging, it would seem appropriate that the NHSIA be the lead organisation (it has confirmed that it is willing to undertake the role of promoting the adoption of the standard numbers and giving technical advice).

- 2 The NHSIA will also, as part of its proposed role, establish an agreement with the telecoms industry, whereby when an acute trust purchases a new system or major upgrade, the recommended standard numbers are incorporated in internal extension systems.

## **7.2 Feedback to acute trusts of the results of the feasibility study**

- 1 It is recommended that the NPSA in conjunction with the NHSIA should feed back the results of the feasibility study to acute trusts through the Chief Executives Bulletin. Additionally the detailed report from the survey completed by switchboard managers should be made available to them, with thanks for their support for the study and to promote a higher level of awareness of the current policy. The level of awareness has already been increased by the review itself, as evidenced by enquiries made to both the NPSA and NHSIA by trusts contemplating changes to their cardiac arrest number.
- 2 The Resuscitation Council could also play an important role in sustaining a higher level of awareness of the clinical advantages for patients and the reduction in stress on staff which adopting a standard number for cardiac arrest calls could achieve. The Council is well placed, via the network of Resuscitation Officers working in acute hospitals, to ensure relevant local managers are periodically reminded of the recommended guidance on this issue. The Resuscitation Council has confirmed it is keen to play a part in promoting the adoption of the standard number.
- 3 It is also recommended that hospitals ensure that they introduce a caller location recognition facility to minimise uncertainty and delay in dispatching an arrest team to a particular part of the hospital. This would reflect the European Union recommendation for community emergency number systems introducing this technology.
- 4 It is also recommended that the leadership/technical advice role that the NHSIA is willing to provide is made known to trusts. Additionally that the NPSA and NHSIA will provide guidance on how the change to the recommended number can be adopted with the minimum

transitional risk, e.g. by a checklist of the various areas that will need to be included in any change programme.

## **8 Adopting a wider pattern of standardised numbers**

- 1 The survey conducted in 2000<sup>13</sup> showed that 74% of hospitals have adopted a separate number for cardiac arrests from those used for other types of emergency. The rationale is that this avoids a potential delay should two types of emergency call be made at the same time. It would fit with the NHSIA taking a more proactive role if it were to indicate to telecoms suppliers as well as to switchboard managers that separate numbers should be adopted whenever significant changes are being introduced to extension allocations in acute hospitals.
- 2 There was evidence that the diversity of numbers used for other emergencies was even greater than for cardiac arrests. Furthermore, although the majority of hospitals had three or fewer separate numbers for different types of emergencies (with fire being the one most often having its own number), there were hospitals that had up to six different types of emergency with separate numbers.
- 3 As part of a general risk/delay reduction approach, it would be desirable for the same number being used for different types of emergency in hospitals to be reduced as far as possible. It would be helpful if the NHSIA provided a clear emergency number framework for trusts to organise their internal extension systems for the future. The 2002 NPSA survey showed 35% of acute hospitals use 2222 for other emergencies. It would be highly desirable in ceasing to use 2222 for these other purposes that trusts knew the recommended numbers for other types of emergency. With the recommendation that 2222 be dedicated for cardiac arrest calls, it would be logical, as a minimum, to reserve 3333 (333) for fire calls where a hospital has adopted a separate number for such calls from other emergencies, but otherwise this be the general emergency number.

## **9 Wider recommendations relating to improving the prevention and treatment of cardiac arrests**

- 1 The sponsors of this project have considered the evidence about the scope for reducing the incidence of cardiac arrests in hospitals and thereby reducing the burdens/stresses experienced by front-line staff responding to cardiac arrests. These pressures were recognised as likely to be more significant than those associated with the diversity of telephone numbers currently in use. This wider/ more significant issue was outside the remit of this study. Nevertheless, it has been agreed

that discussions with the relevant professional groups should take place to decide how the evidence base and wide range of current initiatives can best be used to reduce the incidence of cardiac arrests in hospitals and improve survival rates.



## Further details

For further details about the crash call feasibility study please contact:

### **Chris Ranger**

Assistant Director of Safety Solutions (crash call project lead)  
National Patient Safety Agency  
020 7927 9508  
[chris.ranger@npsa.nhs.uk](mailto:chris.ranger@npsa.nhs.uk)

### **Helen Glenister**

Director of Safety Solutions  
National Patient Safety Agency  
020 7927 9512  
[helen.glenister@npsa.nhs.uk](mailto:helen.glenister@npsa.nhs.uk)

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## **The National Patient Safety Agency**

We recognise that healthcare will always involve risks. But that these risks can be reduced by analysing and tackling the root causes of patient safety incidents. We are working with NHS staff and organisations to promote an open and fair culture, and to encourage staff to inform their local organisations and the NPSA when things have gone wrong. In this way, we can build a better picture of the patient safety issues that need to be addressed, and develop practical solutions to patient safety problems.

### **Standardising the crash call number in hospitals**

Having 27 different crash call telephone numbers\* in NHS hospitals causes uncertainty and delay for staff contacting the switchboard in an emergency to summon the crash call team. Patient safety can be improved by moving to a standard crash call number for NHS acute trusts in England and Wales.

\* A crash call number is the number dialled to summon the emergency team following a cardiac arrest in hospital.

## **The National Patient Safety Agency**

4 - 8 Maple Street  
London  
W1T 5HD

T 020 7927 9500  
F 020 7927 9501

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[www.npsa.nhs.uk](http://www.npsa.nhs.uk)