

Patient safety in ambulance services: a scoping review

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Scientific summary

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Background

The role of ambulance services has changed dramatically over the last few decades: the 1980s saw widespread introduction of paramedics and the possibility of delivering lifesaving interventions; the 1990s saw the introduction of sophisticated equipment and use of a wider range of treatments; and, in the 2000s, ambulance services started to take on definitive care roles. This is set against a background of a continued increase in the number of 999 calls and incidents, all of which increase the risk of adverse events (AEs) occurring during ambulance care, as more complex treatments and procedures are undertaken. Most patient safety research is based on hospital data, with some in primary care; however, little is known about the safety of patients receiving ambulance services, when the environment, personnel and conditions mean that AEs are likely to differ. Despite the increasing body of evidence on the occurrence of AEs within hospitals, corresponding data on patient safety while receiving ambulance services are lacking. There is, therefore, an urgent need for robust evidence synthesis to characterise the evidence base associated with AE reporting in NHS ambulance services.

Objectives

The aim of this scoping review was to identify and map the available evidence relating to patient safety when using ambulance services and to identify gaps in the evidence base concerning UK ambulance services and their international equivalents. Three research questions were defined for the project:

1. What is the national and international evidence base for patient safety when using ambulance services?
2. What are the significant gaps in the evidence base for which research might add value, through either addressing new questions or replicating international research in the NHS setting?
3. What are the priorities for future policy and research?

Methods

This scoping exercise used multiple methods to obtain information concerning patient safety in ambulance services. Use of a variety of sources enabled consideration of a range of perspectives; the use of multiple methodologies and cross-tabulation of results aimed to reduce the impact of limitations associated with data quality and the tools used. It was accepted from the outset that this breadth of searching had many advantages while accepting that it would limit the depth of analysis in each individual component.

As the starting point for this project, a scoping systematic literature review was conducted to comprehensively identify the available data, including evidence not available in electronic databases, and to assess the quality of the information. Literature reports were included in the systematic review if they contained data concerning any patient for whom ambulance services had been contacted or if the outcome was avoidable harm/risk of harm by acts of omission or commission. Relevant studies were identified using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology.

The prominence of patient safety activity reported in publicly available documents produced by ambulance services (annual reports and quality reviews) and safety issues identified by agencies such as the National Patient Safety Agency (NPSA), the NHS Litigation Authority (NHS LA) and in coroners' reports were also considered; data were extracted from annual reports using a two-stage thematic analysis, with a conceptual analysis to identify patient safety activity themes and a relational analysis to explore how risk

and identified need are reported. Data were extracted from quality accounts and collated, and safety priorities for 2010/11 were tabulated and considered in a thematic analysis. NSPA incident report data were downloaded, collated and displayed comparatively using descriptive statistics and claims reported to the NLSLA by ambulance service trusts from 1995/96 to 2010/11 were analysed to identify the number of claims that resulted from mistakes and/or poor service and the cost of such claims. Summaries of coroners' reports issued from 2008 to 2011 for which there was ambulance service involvement were assessed using a thematic analysis to identify the patient safety issue that triggered the coroner's report.

To inform on aspects of staff and user perceptions, an ambulance service questionnaire was developed that identified and ranked potential safety concerns; in addition, data from the Care Quality Commission's (CQC) NHS Service staff survey were analysed.

In order to make recommendations for future research directions for UK ambulance services, data from the systematic review, document and database review, and ambulance service staff interviews were prioritised using a three-stage Delphi process. The prominence of various components was also established by seeing the frequency with which topics occurred across the methods.

Results

The systematic literature search identified 24,255 studies, of which 330 were identified as relevant; relevant studies explored different aspects of safety in health-care settings. In line with the remit to map the evidence, a grid classifying 25 different topic areas was developed identifying key themes as assessment/management, audit/clinical governance, communication (clinician-patient/interprofessional/documentation), decision-making, diagnosis, dispatch, equipment/resources, handover, individual factors, infection control, information technology, medication administration/incidents/errors, non-conveyance, observation/monitoring, pathways, organisation process, public involvement, quality improvement, safety culture, scene management, skill set/mix/competencies/knowledge/creep, time factors/delays, training/education/research, transfer (interhospital) and treatments/procedures. The literature review highlighted a lack of quality literature in terms of robustness of design. Most studies were small and undertaken at single locations and publications rarely gave sufficient detail for the reader to understand the generalisability or applicability of the findings. This also meant that meta-analysis was not possible. Specific themes raised included findings that ambulance transfer to some specific specialist centres has been shown to be safe and effective, but the bypassing of local accident and emergency (A&E) departments for many conditions has not been conclusively proven as safe. There is some evidence to support the operational effectiveness of the 'hear and treat' approach, but few studies inform on clinical safety; the evidence for 'see and treat' at the scene has less supporting evidence and equipment failure safety issues mainly relate to stretcher collapse or the recognised hazards associated with defibrillators.

A framework of 25 themes was developed from the literature and used to assist in assessing the relative prominence of themes from the various methodologies.

Official reports from ambulance services were highly variable in their patient safety content; their lack of standardisation made it difficult to draw conclusions about safety priorities or concerns. The reports did describe some common topics, including infection control, safeguarding, alternative care pathways and safety culture. However, these may result from national priorities and targets rather than from an ambulance service's analysis of its safety issues.

National Patient Safety Agency data for ambulance services were difficult to interpret as they are presented in a framework designed for all providers; for example, falls may include safety issues unique to the ambulance service (falls from stretchers and carrying patients down stairs). Ambulance services appear to be relatively slow at reporting incidents. Secondary analysis was not possible because of non-availability

of the original data at the time of this review. Four categories accounted for the majority of cases: access/admission/discharge, patient accidents, devices and equipment, and treatment.

Litigation data were recognised to be of poor quality for the purpose of this scoping exercise. Only the publicly available database could be analysed in this scoping review. It identified the key causes of litigation incidents as being associated with lack of care, failed or delayed treatment, failed or delayed admission, failed or delayed diagnosis, and failed or delayed referral. Once again, this highlights the need for specialist skills and competencies when introducing alternative pathways, particularly those enabling ambulance services to effect discharge.

Coroners' reports also reflect the 'tip of the iceberg' of patient safety issues, relating only to unexpected deaths and having variable thresholds of usability. Only those resulting in a section 43 notice were available for analysis. A high proportion of coroners' reports highlighted communication or patient assessment skills as the main issue – others commented on training, treatment, culture and equipment. Once again, the issues around alternative pathways were highlighted as a major safety concern. It is acknowledged that there are aspects, including communication and culture, that may not have been explicitly mentioned in other data sources, but may be underlying root causes of patient safety incidents.

Interviews with medical directors and senior staff highlighted 10 main issues of concern: three related directly to alternative care pathways (call handling triage/categorisation, decision to leave at home, allocation of patients at colocated sites), two indirectly to clinical skills (medication errors, increased clinical intervention) and two to handover at A&E departments (delay in gaining access to hospital, handover process at the hospital). Other issues of concern comprised equipment failure/shortage, skill mix of available staff and resources available to respond, and the handover rated most highly as an area of concern. The patient forum tended to highlight concerns regarding clinical skills, decision-making and communication.

The CQC staff survey had a low response rate but clear trends highlighted issues around cultures inhibiting safe practices and lack of feedback mechanisms. They were also critical of the levels of training, which may be particularly important, as new skills are required for alternative pathway design.

This scoping review was limited by the quality and extent of information available. Limited detail in databases and differing coding systems meant that the various information sources could not be amalgamated, or even directly compared.

This scoping exercise clearly illustrated the lack of quality information available regarding ambulance service patient safety in the UK. The findings confirm a consensus of opinion and evidence that key areas for future work in patient safety in ambulance services are alternative pathways, knowledge transfer, communications and safety culture. The findings are relevant to commissioners, and non-conveyance and the research into assessment/recognition of serious illness (including the appropriateness of using early warning scores) are areas that should be prioritised. Ambulance services should look into aspects of communication and culture to understand better how they impact on the quality of the care being offered.

Conclusions

Implications for health care

Ambulance services have to make key strategic decisions without high-quality evidence to indicate that models of care are safe and without knowing the level of clinical risk in the system or how such risks can be mitigated. It appears that patient safety needs to become a more prominent consideration for ambulance services. This study identified many reports of cases for which operational pressures, including targets, were perceived to be more important than patient safety for ambulance services.

The culture of the organisation needs to be understood, with consideration being given to the influence this can have on patient safety.

As ambulance services develop new models of working, they need to ensure that staff are adequately trained and have means of monitoring clinical risks and intervening, if required, and effective feedback mechanisms are important in this process. The complexity of training staff working in a mobile workforce, whose members are often isolated from colleagues, was a recurring issue in safety reports. Providers and commissioners need a full understanding of the safety implications of introducing new models of care, which requires a body of supportive evidence and an inherent critical evaluation culture.

It is recommended that services review patient safety with a particular focus on patient assessment and management, communications, equipment and resources and non-conveyance, as these were most prominent in many of the methods used.

Clinical studies undertaken in secondary care are often applied to ambulance service practice owing to lack of evidence specific to this setting, but it is often difficult to extrapolate the findings. Hence, current national guidelines often rely on consensus opinion regarding applicability to the pre-hospital environment. Ambulance services could benefit from an in-depth review of national databases, to determine whether or not they address the specific needs of this small but important group of users.

Implications for research

Most of the research identified during this study was of poor quality and it was often related to small studies of individual ambulance services. This suggests that future research needs to implement larger studies that are adequately powered to demonstrate an effect. Ambulance services are relatively new to clinical research and the absence of quality data specific to the pre-hospital care environment may reflect that immaturity. Research support for ambulance services and encouraging increased links with academic institutions may be appropriate. The areas of greatest concern for which a need for major research projects is indicated are:

- understanding the effectiveness and safety of alternative pathways
- understanding how knowledge transfer is best achieved in ambulance services with their dispersed and mobile workforce
- understanding how communication in ambulance services can be improved; this covers a range of topic areas including 999-call handling, patient communication and handover to A&E departments
- understanding the influence of organisational culture on patient safety and how this can be continuously improved; the historical background of ambulance services may mean different approaches are required from those in other parts of the NHS.

To aid future research we also suggest that:

- there is increased standardisation of categorisations used in various national databases, or usage of categories that can map to each other
- secondary data analysis is undertaken of the databases utilised in this study to understand more detail of incident type and aetiology.

Research into pre-hospital care is required in many areas related to patient safety including basic safety science, looking at how best to measure and analyse safety to give reliable data for effective monitoring, and safety incident detection mechanisms.

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