

# Electronic records in ambulances – an observational study

## Background

The introduction of information technology in emergency ambulance services to electronically capture, interpret and store patient data can support out of hospital care. Although electronic health records (EHR) in ambulances and other digital technology are encouraged by national policy across the UK, there is considerable variation across services in terms of implementation. We aimed to understand how electronic records can be most effectively implemented in a pre-hospital context, in order to support a safe and effective shift from acute to community-based care.

## Methods

We conducted a mixed-methods study with four work packages:

- a rapid **literature review**
- a **telephone survey** of all 13 freestanding UK ambulance services to explore systems, implementation processes, perceived value and future plans
- detailed **case studies** in four selected ambulance services, along with their associated health communities, to examine the story of implementation and use of EHR. We undertook observation shifts on ambulances to observe EHR in use. We also carried out focus groups with ambulance clinicians, interviewed key stakeholders, and carried out descriptive analysis of routine data on uptake, use and impact of EHR.
- a knowledge sharing **workshop** to discuss findings with stakeholders.

Alison Porter Swansea University; Anisha Badshah Greenwich University; Sarah Black South West Ambulance Service; David Fitzpatrick Scottish Ambulance Service; Saiful Islam Swansea University; Matthew Jones Swansea University; Mark Kingston Swansea University; Yvette LaFlamme Williams Welsh Ambulance Service; Katie McNee South West Ambulance Service; Robert Harris-Mayes SUCCESS service user group; Suzanne Mason University of Sheffield; Heather Morgan University of Aberdeen; Zoe Morrison Greenwich University; Pauline Mountain Service User; Henry Potts University College London; Nigel Rees Welsh Ambulance Service; Debbie Shaw East Midlands Ambulance Service; Niro Sirirwardena East Midlands Ambulance Service & University of Lincoln; Helen Snooks Swansea University; Rob Spaight East Midlands Ambulance Service; Victoria Williams Swansea University



Swansea University  
Prifysgol Abertawe

This project was funded by the National Institute for Health Research HS&DR programme (project number 14/47/22). The views and opinions expressed herein are those of the authors and do not necessarily reflect those of the HS&DR programme, NIHR, NHS or the Department of Health.

Contact: Alison Porter a.m.porter@swansea.ac.uk

## Results

**Literature review:** We found that, while there is an extensive and theoretically developed literature examining the implementation of technology into healthcare more generally, there is a very limited range of published literature specifically on EHR in ambulance services.

**Telephone survey:** We completed interviews with 22 managers from 13 services. Implementation varied: 7/13 services were using EHR; 6/13 services were currently using paper records, of which four had previously adopted EHR, but reverted to paper. Those who had fully implemented EHR reported mixed success in terms of staff compliance or in realising the potential benefits offered by EHR to link with primary and secondary care. Reported benefits of EHR were largely associated with improved data management for audit and record keeping. Potential improvements to patient care were discussed, but tended to be associated with future planned developments.

**Case studies:** Although we had planned to observe four services at distinct stages of implementation, we discovered that the situation was more complex and fluid than this. We saw some indication of data being transferred into and out of EHR systems to support patient care, none of these seemed yet to be being used to their intended potential.

Positive aspects observed included vision and enthusiasm from senior managers; front line staff open to new systems; benefits in terms of data quality, confidentiality, and efficient storage and searching for audit and medico-legal use. Challenges included difficulties with interoperability, technical issues and the need to update systems (software and hardware) without undue disruption.

Our analysis of routine data found levels of EHR creation at the time of the data sample ranged across sites from under a third of calls to over 99%. Factors associated with a lower rate of EHR completion included call received within routine working hours, call categorised as low priority, patient not conveyed, and mental health condition as reason for the call. In one site, we found strong associations between completion rates and which hospital the patient was conveyed to, but this service was still in the process of roll-out of a new EHR system.

**Workshop:** Stakeholders attending the workshop felt the findings resonated with their own experiences, and found it valuable to share knowledge with others. Discussion groups identified the need to present front line staff with the optimum software; the value of empowering staff by providing feedback on patient outcomes; the need for information handover at the ED to be simple and streamlined; the role of a single point of ownership in the organisation; anxieties about data currency.

## Common themes

**Digital diversity:** There is no standard hardware or software in use, with great variation in how (and whether) other technology and record systems were linked to the EHR.

**Constant change:** Services were often transitioning from one system to another, from one supplier to another. When they were not, there were software and hardware updates. There was even switching back from electronic systems to paper records.

**Imperfect information:** In real patient encounters, clinicians are likely to be dealing with partial or unclear information, which does not arrive to them in a pre-ordered sequence.

**Indirect input:** Some patient data can be fed straight into the EHR, but data entered by clinical staff is still sometimes written on a glove or notebook, or just remembered, before being entered into the EHR.

**Data dump:** The primary function of EHR in all services seemed to be as a store for patient data. There was, as yet, limited evidence of their full potential being realised to transfer information, support decision making or change patient care.

**The system is bigger than the service:** To realise all the benefits of EHR requires engagement with other parts of the local health economy – and dealing with variations between providers and the challenges of interoperability.

**Different data demands:** Clinicians and data managers, and those roles in different parts of the health economy, are likely to want very different things from a data set, and need to be presented with only the information that they need.

**'Ford Fiesta, not a Ferrari':** Sometimes simple is best.

## Conclusions

Realising the full benefits of EHR requires engagement with other parts of the local health economy, dealing with the challenges of interoperability. Clinicians and data managers are likely to want very different things from a data set, and need to be presented with only the information that they need.