Nursing Practice
Innovation
Electronic records

In this article...
● Challenges and benefits of electronic maternity records (EMRs)
● Bradford maternity service's experience of introducing EMRs
● Wider lessons for health information technology projects

Implementation of an accessible electronic maternity records system

Key points

1 Paper maternity records can be illegible, forgotten or lost, potentially causing delays and increasing risk

2 Electronic maternity records give staff instant access to clinical notes, improving patient safety, efficiency and data quality

3 To adopt EMRs, community midwifes need good mobile technology and connectivity, as well as robust training and support

4 When changing from paper to electronic records, service users' access needs must be considered

5 Implementing health information technology requires all future users to be involved, existing work practices to be supported and technical issues to be addressed

Authors Dawn Jankowicz is specialist midwife (maternity information system), Bradford Teaching Hospitals Foundation Trust; Philip David Miller is knowledge evaluation researcher, East Midlands Academic Health Science Network, University of Nottingham; Lucy Sitton-Kent is senior research fellow (innovation and translation), East Midlands Academic Health Science Network and Nottingham University Business School.

Abstract The NHS has a target to go paperless by 2018, but the scale of the task is formidable. In 2007, the maternity service in Bradford began replacing traditional paper records with electronic records that can be accessed by any user, anywhere. The change was huge, particularly for community midwives, who had to learn to use mobile technology – and cope with connectivity problems. Involving, training and supporting staff was crucial to ensure full engagement. This article describes the project, challenges, benefits and lessons learned.

The NHS has been set the goal of becoming paperless by 2018, with the aim of making it "the most modern digital health service in the world" (Hunt, 2013). This means all written information used to record, plan and communicate the care delivered across the entire service must be digitised.

Introducing change is always challenging, but introducing electronic health records is particularly complex (Greenhalgh et al, 2008). There are several issues to address, including choosing the right system and providing the right support. Contextual factors are likely to present the biggest challenges; for example, how will staff adapt to a new system? How will the system and the process of adapting to it affect existing practice? (Lawler et al, 2011; Lluch, 2011).

The introduction of electronic maternity records (EMRs) is not without problems: concerns have been raised about the burden of data entry and loss of flexibility seen with earlier systems (Fawdry et al, 2011).

This article describes the implementation of an EMR system at the maternity service of Bradford Teaching Hospitals Foundation Trust (BTHFT).

Why change to EMRs?

BTHFT provides hospital and community maternity care to over 6,000 women a year. It has 400 staff who use maternity records, 60 of whom are based in the community.

In 2011, the maternity service sought a cost-effective way to give all staff access to EMRs, including from mobile devices, with community midwives accessing the system via laptops using a virtual desktop infrastructure (VDI). Women cared for by the maternity service would also need to retain access to their information.

Three main factors driving the change to an EMR system were:
● BTHFT had implemented an EMR system in 2006 to provide data for the Born in Bradford cohort study (Raynor and Born in Bradford Collaborative

Nursing Practice
Innovation

Fig 1. **Timeline of the project**

2007 Delivery of summaries and operative deliveries recorded on the EMRs

2011 Post-natal summaries recorded on the EMRs Medway Maternity short booking summaries used alongside detailed paper record

Separate pilot study by two community midwives to use the system more widely in te community alongside paper records

2014 All bookings and subsequent anenatal care recorded on the EMRs

Referral processes and scan department still using paper

2015 Referrals managed via the EMRs

Group, 2008), but was using only a small proportion of its functionality;
- The maternity pathway payment system was challenging for staff, who had to enter data on paper forms;
- BTHFT had been a pilot site for the Maternity Services Data Set (Bit.ly/HSCICMaternityDataSet) for several years, and the maternity service recognised the difficulty and expense of retrieving data from paper records.

The project involved a dedicated EMR team (Box 1), which worked with clinical teams in hospital and the community, and the trust's informatics team. Although community midwives had concerns about the change, there was widespread acceptance of the need to change the way information was recorded, stored and accessed.
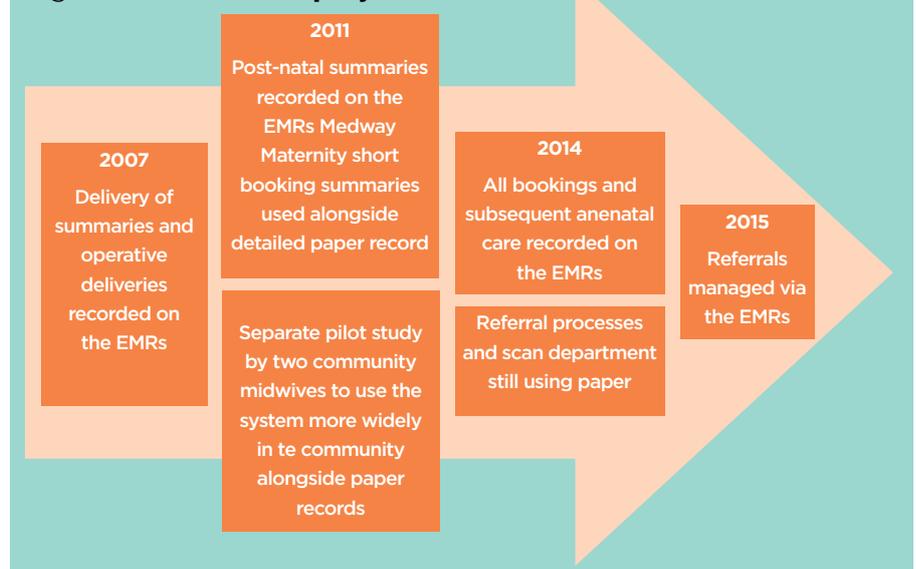
Implementation journey
The IT solution chosen was Medway Maternity, provided by System C. The next step was to map out the project's implementation journey, which would need to address:
- Stakeholder engagement;
- Feedback from service users and staff;
- Timelines;
- Training needs analyses;
- Arranging access to the system;
- Costs and benefits;
- Monitoring progress.

From 2006 onwards, the EMR team organised regular engagement with all stakeholders, including community- and hospital-based midwives, obstetricians, physiotherapists, ultrasonographers, ward clerks, IT staff, managers and service users.

The EMR team organised meetings with, and visits to, community- and hospital-based staff in all clinical and administrative roles. At the maternity unit, team members worked in, and visited, clinical areas, enabling them to engage informally with clinical staff. Other communication channels included newsletters and posters. Service-user engagement took place via formal meetings, questionnaires and informal discussion. Clinical members of the EMR team maintained their professional registrations to retain clinical credibility and reassure staff this was a clinically focused, not IT-led, project.

A 'lessons learnt' document was circulated weekly by email and hard copy to all staff that highlighted current issues and provided advice, guidance and information on accessing support.

Fig 1 shows the project timeline. As with all health information technology (HIT) projects, change happened in stages. Our approach reflected Gustafson et al's (2003) finding that widespread, early involvement of staff at all levels enhances the success of change implementation.

Staff training
A trainer was employed to teach staff how to use the antenatal element of Medway Maternity. An additional IT post was created to provide mobile support to community midwives experiencing problems. Some community staff had concerns about carrying laptops with them, and were given training on best practice regarding security, such as keeping them out of sight or in the boot of their car when travelling.

Staff were also concerned about the size and weight of their loads, but realised the EMR system would reduce the amount of equipment they would need to carry, as they would no longer need caseload files and booking packs.

Student access
As well as midwives, senior midwifery students managing their own caseloads also needed access to the EMR but, for security reasons, could not use their mentors' VDI. The VDI software was therefore installed on University of Bradford laptops and students' personal devices. Students were given secure personal log-in details, so they could manage their own caseloads under the remote supervision of their mentor; this supported existing work patterns rather than disrupting them.

Service user access
Involving service users is a key factor of service improvement (Wenzel and Jabbal, 2016) and was vital here. The established practice was for pregnant women to carry their own paper maternity record, so there were concerns about how to ensure they had such easy access to their records once the EMR system was in place.

Before paper records were phased out, a survey of 101 pregnant women was conducted between November and December 2013. All women attending randomly selected glucose-tolerance test clinics (all pregnant women in Bradford are offered these tests) were offered the chance to participate, along with community antenatal clinic attendees. This showed most were happy with an electronic format as long as access remained possible.

All 101 women returned the questionnaire. Of 91 respondents to a question on computer know-how and access, 75 said they had access to a machine and knew how to use it; 13 had computer skills but no easy access; and three were unable to either access or use a computer. Only 35 respondents specified wanting to retain paper records and be given them by the

Nursing Practice
Innovation

Nursing Times.net

For more articles on workforce and systems, go to **nursingtimes.net/management**

Box 2. **Benefits of the maternity EMR system**

- Data can be viewed in real time, and updated by any care team member
- Clinicians can access EMRs from community bases to check, for example, test results or clinical guidelines
- Community midwives now have access to work emails and other information, which can promote inclusion and reduce travel time
- Far fewer records contain information that is illegible
- All entries carry a record of who made it and when, thereby increasing accountability and safety
- Better, easier-to-access information is available for clinical governance and audit
- The whole record of the pregnancy is no longer lost if a woman loses her paper notes
- Paper records could be left unattended or lost, and so be accessed by others without the woman's consent; this risk to confidentiality has been reduced
- Duplicate data entry for the maternity pathway payment system reduced

---

midwife. Many advantages to EMRs were identified.

The survey results suggest it is access to records that is important to service users, not the method of access. Introducing EMRs would allow access to be maintained while overcoming some disadvantages of paper records identified by respondents – such as notes being illegible, having to carry the record with them, and worrying about losing it and confidentiality issues.

Initially, an encrypted email system, complemented by a consent form verified by the patient's antenatal care midwife, was used to allow women access to their record. Those without computer access were asked to contact the EMR team for a copy of their record, which they could then collect on presentation of photographic identification.

Use of the access system was reviewed after one year: only 4% (*n* = 253) of women cared for by the maternity service had requested a copy of their record via the encrypted email system, so this option was removed. The number of women requesting a paper copy of their record remains low, at around two per week. However, there is a 24/7, 365-days-a-year process in place for a woman or carer to access records immediately: during office hours, women contact the EMR team to arrange collection; if the notes are urgently required this can be done out of hours via the labour ward.

Costs and benefits

It is difficult to calculate precisely the return on investment after introducing IT in a complex care system (Payne et al, 2013). The many variables in clinical settings mean calculating exact efficiency savings would entail a large-scale study of pre- and post-implementation activities – which could cost more than the savings achieved.

The NHS Nursing Technology Fund provided £346,000 to roll out the project, while the initial capital expenditure was £368,180. So far we have identified that the trust saved £15,331 in printing costs between April 2014 and March 2016. Paper records comprise 25 double-sided sheets of paper; with most women using EMRs, paper use was reduced to almost zero.

Many benefits are difficult to identify and/or quantify. While some can be directly attributed to the EMRs, others may also be the result of other BTHFT initiatives; Box 2 outlines benefits other than printing and paper savings. There may also be significant benefits to come – better-quality information should lead to more efficient decision making in complex cases thereby reducing overnight stays, and lower litigation costs may result from a positive impact on safety (this is unlikely to become apparent for several years due to the claim process timeline). These and other potential benefits are in line with those foreseen by the National Mobile Health Worker Project (Department of Health, 2013).

It is often thought that electronic records mean reducing the number of

posts but, so far, we have seen no evidence of that. We also assumed community midwives' mobile phone bills would decrease – in fact, they increased, as staff needed support while getting used to the technology and new ways of working. Community staff tend to rotate quickly, so we are still seeing higher mobile phone bills, and it is too early to say whether this will change.

Lessons learned

The EMR system is now fully functional across hospital and community maternity sites in Bradford. If there is no internet connection in the community, paper documents are used and the EMR is updated when a connection is available.

Feedback from midwives and obstetricians is shown in Boxes 3 and 4. Implementing the project generated several learning points; one was that the key focus of clinical leaders should remain clinical care and what is recorded about it, rather than the technical details of how things are recorded. Further learning points are described below.

Pilot study

A separate pilot study conducted for community users was crucial, as it enabled the EMR team to identify how best to:

- Encourage people to use the system;
- Evaluate how much support would be needed once it was fully rolled out;
- Establish key training messages.

Pilot phases should involve listening to, and learning from, staff, to ensure adoption is widespread.

Connectivity

Connectivity was the biggest problem outside the hospital setting. Although the locations of community services had been thoroughly mapped beforehand, in the first couple of months after roll-out, connectivity issues led to problems with the

---

Box 3. **Feedback from midwives**

- Midwives have access to comprehensive information, including about previous pregnancies ("We can check the woman's full history")
- There is "less equipment to carry now that heavy paper booking packs are no longer required"
- When a woman does not attend clinic, the new system allows midwives to see immediately whether she has delivered or whether she is an inpatient, thereby reducing the number of phone calls ("We can see what has happened")
- The system allows direct referral to other services – for example, smoking cessation, or health visitors – so no further action is required from community midwives
- Midwives can make confidential notes in records that will not show on printed documents if a woman requests a copy of her notes (although the woman can still see these comments on request)

Nursing Practice
Innovation

Box 4. **Feedback from obstetricians**

- "Electronic maternity records have so much more to offer than paper records: highlighting risks and problems, which wasn't easy to do with paper records; audit is so much easier; timely output and up-to-date information"
- "Always have access to information; for example, if a woman does not attend her appointment, I can see whether or not this is a problem and can record it"
- "Ability to keep the record very up to date as results come in, review and act rather than wait for the next appointment"
- Hospital-based clinicians can now review a woman's record and be fully informed about her situation and previous care before she arrives in hospital after referral
- There are still challenges due to the high turnover of junior medical staff, who need to be trained to use the system ("They just get good and then move on")
- "We could do better triage, in future, of referrals from community midwives and reduce paper trails there"

SIM cards in community midwives' laptops. This issue is still being addressed; new SIM cards and collaborating with council services to use their networks are potential solutions. To work around these problems, staff used primary care PCs and other 'hot-desking' solutions to access the VDI, as well as occasionally reverting to paper records.

Training and feedback
Training and feedback were crucial to:
- Enable staff to use the system to the best of its capacities;
- Encourage them to raise issues – and try to address these independently.
- Encourage staff to apply the same standards when documenting care in electronic records as they would on paper.

Nursing and Midwifery Council Code
The NMC's (2015) code of conduct underpinned the changes in practice. Implementing EMRs has improved our compliance with many of the Code's record-keeping standards. It has been rewarding to note the many improvements made to clinical practice – such as to legibility of records – and the Code has provided a robust framework for decisions regarding roll-out.

Technical support
The team learned not to underestimate the support needs of staff members. Technical support for community staff was essential and had to be mobile in the geographic area, so the community IT team member would travel to meet staff and help them resolve any problems encountered. Immediate technical support was essential during roll-out, as clinicians could not wait in a queue on the phone during a busy clinic session.

Good technical support is key to gain staff support for a new system. Initial bad experiences with technology, especially when it interferes with clinical care, can make staff less willing to accept HIT in the long term. Excellent communication between users, trainers, support staff and IT staff is also needed to reduce that risk.

Super-users
Creating super-users among senior staff is common when implementing HIT. Initially it was difficult to train senior staff due to the many unknowns of using the system in practice. Some were overburdened by having to learn a new mechanism of reporting and providing administrative support to their staff, and needed extra training and assistance.

Alongside the community support role, there was a similar post in the hospital setting. A third role – dedicated specialist clinician – monitored clinical use of the system, which led to consistent messages being communicated during roll-out. The team was completed with two community midwives seconded during the implementation phase.

Buddy support
Senior staff sometimes felt threatened by younger colleagues who were more at ease with IT, but it was also recognised that a good IT user is not necessarily a good practitioner or a good record-keeper; for example, staff who enter bookings more quickly than their colleagues may be more familiar with the system, or may not be fulfilling all the requirements of the booking process.

We found no evidence to substantiate the latter, but did conclude that a 'buddy' support system would have helped junior and senior staff increase their clinical and technological confidence, respectively.

Colleagues helped each other in an ad hoc manner, depending on their availability and skills but a more formal buddy support system would be beneficial.

Conclusion
Despite the scale of the task, we successfully integrated an EMR system into both hospital and community clinical practice. A survey of service users showed many women were happy not to carry a paper copy of their notes, as electronic access was easier.

Having staff who wanted the project to succeed was crucial; clinical staff understood the reasons for the change and had a chance to influence the transition. Robust support was provided when and where needed, and staff were recognised for their part in creating a paperless records service.

Consulting the wider trust informatics teams and the dialogue between IT and all other stakeholders was ongoing was essential to resolving technical issues. Working with electronic processes is a big leap for staff used to paper but, thanks to a can-do attitude from all staff and excellent technical support, the project was a success. **NT**

References
Department of Health (2013) *National Mobile Health Worker Project: Final Report.* Bit.ly/DHMobileHealthWorker
Fawdry R et al (2011) Data re-entry overload: time for a paradigm shift in maternity IT? *Journal of the Royal Society of Medicine;* 104: 10, 405-412.
Greenhalgh T et al (2008) Introduction of shared electronic records: multi-site case study using diffusion of innovation theory. *BMJ;* 337: a1786.
Gustafson DH et al (2003) Developing and testing a model to predict outcomes of organizational change. *Health Services Research;* 38: 2, 751-776.
Hunt J (2013) *From Notepad to iPad: Technology and the NHS.* Bit.ly/HuntNotepadToIpad
Lawler EK et al (2011) Cognitive ergonomics, socio-technical systems, and the impact of healthcare information technologies. *International Journal of Industrial Ergonomics;* 41: 4, 336-344.
Lluch M (2011) Healthcare professionals' organisational barriers to health information technologies: a literature review. *International Journal of Medical Informatics;* 80: 12, 849-862.
Nursing and Midwifery Council (2015) *The Code: Professional Standards of Practice and Behaviour for Nurses and Midwives.* Bit.ly/NMCCode2015
Payne TH et al (2013) Healthcare information technology and economics. *Journal of the American Medical Informatics Association;* 20: 2, 212-217.
Raynor P, Born in Bradford Collaborative Group (2008) Born in Bradford, a cohort study of babies born in Bradford, and their parents: protocol for the recruitment phase. *BMC Public Health;* 8: 327.
Wenzel l, Jabbal J (2016) *User Feedback in Maternity Services.* Bit.ly/KFFeedbackMaternity

For more on this topic go online...
- Views on and perceptions of a paperless NHS
  Bit.ly/NTViewsPaperlessNHS