

A multi-centre qualitative study on the use of machine learning within obstetrics

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Objective

Machine learning (ML) is rapidly evolving and showing great promise. However, there is limited information on opinions of healthcare workers on the use of these technologies within maternity care.

The aim was to understand trust in ML technologies in maternity care, and barriers to their incorporation.

Design

Prospective, multi-centre, qualitative study in Canada, Nigeria, Rwanda and the UK, using semi-structured interviews with healthcare workers.

Method

Purposive and snowball sampling methods were employed to ensure inclusion of a balance of genders, ages and professions within maternity care. Participant interviews, conducted face to face or over Teams, were recorded and transcribed verbatim. Data saturation was monitored at each site, but was only reached once data from all sites was combined. Data saturation was achieved once interview scripts were no longer generating new codes. Initial themes were developed by inductive content analysis of data in an iterative process. Themes were then allowed to emerge and codes grouped. Emerging themes and codes were discussed and agreed by consensus. Transcripts were revisited to ensure codes were exhaustive and complete.

Vision

Improve outcomes for women & their babies

Objectives

Improve access to skilled healthcare

Streamline clinical workflows

Improve accuracy

Strategies

Improve workflow

Support clinical decisions

Follow best practice & keep up to date

Remove subjectivity

Tactics

CTG analysis

Imaging

Diagnosis

Risk prediction

Audit



Figure 1: Strategic framework for using machine learning to improve outcomes in maternity care

At the research stage

At the research stage

- Extensive testing prior to implementation
- Consideration of dataset demographics and transparent reporting
- Performance in rare/unusual presentations
- Early involvement of healthcare workers in the research process
- Rigorous regulatory process

Prior to implementation

Supporting infrastructure

- Power
- WiFi
- Data privacy

Barriers to be addressed

- HCW & patient reluctance
- Cultural beliefs
- Cost

Training

- Maintenance of core clinical skills
- Training of staff
- Key people to champion ML
- Communication of accuracy, risks, benefits and limitations

Following implementation

Following Implementation

- Monitoring following introduction
- Errors during implementation
- What patients need to know

Figure 2: Process for establishing ML within maternity care. HCW, Healthcare worker. ML, Machine Learning.

Results

Twenty maternity healthcare workers were interviewed, five at each of the four sites, comprising midwives (5), consultants in Obstetrics and Gynaecology (5), residents in O&G (3), nurses (2), maternal fetal medicine consultants (2), one radiology registrar, one family doctor who is involved in maternity care and one maternity support worker.

Overall, healthcare workers feel positively towards ML and recognise that it has great potential to improve outcomes for women and their babies. They expect it will improve accuracy, working environment, care delivery and access to maternity care. It is important to healthcare workers that ML technologies are designed to work alongside humans and not aim to replace them. A strategic framework (Figure 1) was generated and a process for establishing ML within maternity care (Figure 2) outlined.

Conclusions:

Healthcare workers welcome the use of ML in maternity care and recognise its potential to improve healthcare. They envisage working alongside, rather than being replaced by ML technologies. However, this work identified important barriers that must be addressed for successful implementation.