A systematic review of the experiences and views of health care staff about the impact of health information technology on the follow-up of abnormal patient test results.

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Introduction

The follow-up of patient test results is an essential step in the health care process. Failure to follow-up could lead to patient harm.[1] Health Care settings have implemented Electronic Health Record Systems (EHR) in place of paper-based systems to improve communication and recording patient test results. [2] Although EHRs have the potential to improve the follow-up of patient test results, [3] some abnormal test results can still be missed.

Many factors can play a role in the success or failure of EHR implementation. Some factors are related to system design, with others depend on the work environment and organisational policies. [4] Usability studies have mainly employed methods such as expert inspection, simulated experiments, and self-reported user satisfaction surveys.[5]

Aim

To review the literature to understand experiences and views of health care staff about the impact of EHRs on the follow-up of abnormal patient test results.

Methods

This review followed the PRISMA guidelines and was registered on PROSPERO (CRD42016042944).
Critical Appraisal Skills Programme (CASP) tool was used for quality assessment.
The screening steps of titles, abstracts, and full texts were conducted by three independent reviewers. They also assessed the quality of each included article.
Four databases were searched from January 2005 - July 2016: Embase, Medline, CINAHL and PsycINFO.
Primary articles were included if they focused on (1) any type of EHRs used for the follow-up of test results, (2) healthcare staff opinions and views of system(s), (3) any type of test result(s), (4) all disease states in both adult and paediatric populations, and (5) any setting (e.g., primary, secondary, tertiary care). Commentaries, editorials, letters and any studies not available in English language were excluded.

Results

Our search returned 1,178 publications, 79 of which were duplicates. One thousand and eighty were eliminated at the title (600), abstract (478) and full text stages (2). Nineteen articles were initially included, but following a further discussion between the three reviewers, four articles were felt to not sufficiently cover healthcare staff opinions and views and were subsequently excluded. Fourteen articles and one abstract met our inclusion criteria with the majority of these studies conducted in the U.S.A. Six main themes were identified:

1. **Systems' design and usability,** which included the layout of the computer screen and what effect this layout had on users' ability to view and follow-up abnormal test results.

2. **Staff workload,** which included the impact of alert notifications generated of the system. Receiving a high number of system alerts, some of which were felt to be either inappropriate or unnecessary, appeared to increase providers' workload and negatively impact on the follow-up process

3. **Systems' infrastructure,** which included both hardware and software, and how this impacted on users' experiences. Unexpected hitches with the power supply (e.g., electric shortage) resulted in test results not being appropriately followed up; however, systems with more random access memory (RAM) were shown to improve the transmission process according to some participants in one study.[6] Some systems had the functionality to monitor staff performance by identifying test results which had not been followed up, thus providing a safety net.

4. **Communication between systems**. This included how systems communicated across different settings or departments, with good communication felt to reduce the need for ordering repeated tests.

5. **Staff training.** Providers' awareness of certain system features may have been related to the training that they received, which was described in one study as "pretty lackluster". [6]

6. **Users' feedback.** Users' feedback on how to improve system functionality was shown to have led to improvements in the follow-up of test results.
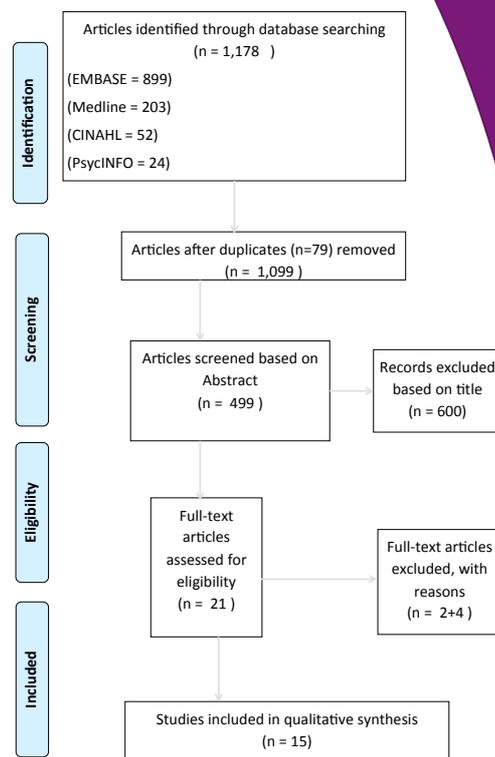
Conclusion

Based on our analysis, a number of interlinked themes appeared to have an impact on the follow-up of abnormal test results while using EHR. The ease with which providers used EHR systems also appeared to influence their ability to follow-up test results. Although this review provides a snapshot of EHR systems, more research is needed to explore how systems could be further improved. This review only focused on healthcare staff experiences and did not cover patients' experiences.

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