Factors influencing the successful clinical implementation of electronic patient report outcome / experience measures (ePROMs/ePREMs)

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Introduction

Patient reported outcome measures (PROMs) and patient reported experience measures (PREMS) gather information on a patient's views on their health outcomes and experience of care respectively. Electronic PROMs and PREMs (ePROMS and ePREMS) to allow patients to fill in ePROM/ePREM questionnaires using technologies such as websites or apps for smartphones and tablet devices.

Although PROMs and PREMs were created for use in research settings, they are increasingly also being used in clinical settings to improve communication between patients and clinicians, as well as to assess the quality of care. However, implementation of ePROMs/ePREMS may create additional challenges and opportunities related to the use of technology in healthcare settings.

The aim of this systematic review is to assess the facilitators and barriers to implementing ePROMs/ePREMs in health care settings.

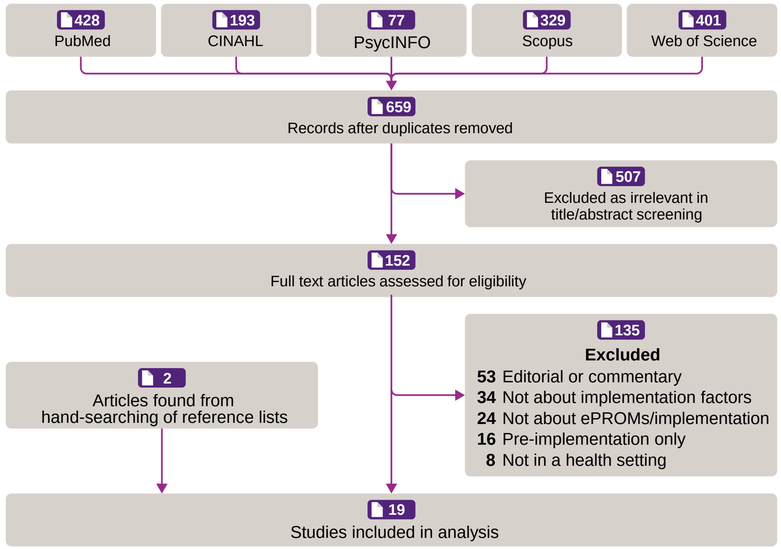

Figure 1: PRISMA flow diagram of the search process.

Method

Five databases were searched (PubMed, CINAHL, PsycINFO, Web of Science and Scopus) on October 2020. Search strategy for each database had the following format:

1. prom OR prem OR patient reported outcome* OR patient reported experience measure*
2. implement*
3. electronic OR digital OR mHealth
4. 1 AND 2 AND 3

Two reviewers (BG & JS) screened titles and abstracts for inclusion in full text review, and full texts for inclusion in the systematic review. Articles were included if they reported results relating to ePROM/ePREM implementation in a healthcare setting. Articles were excluded if they did not report results, were related to ePROM/ePREM implementation in a research/trial context or were focused on pre-implementation research. Disagreements were resolved through discussion or conferring with a third reviewer.

A descriptive code-based synthesis of the results was established by two researchers independently coding the included manuscripts. The two reviewers then discussed each code category until they arrived at a consensus set of codes and categories. Consensus code categories were mapped to the Consolidated Framework for Implementation Research (CFIR).

Quality was assessed using the Mixed-Methods Appraisal Tool (MMAT). Studies were appraised independently by two reviewers (BG & JS), and a consensus quality rating for each study was derived through discussion.

Intervention characteristics	Outer setting	Inner setting	Characteristics of individuals	Process
Graphical visualisations of results	ePROMs facilitating patient-centred care and amplifying patient's voice	Regular training and education to build staff capacity and confidence with the ePROM/ePREM system	Improving prioritisation and targeting of patient-clinician communication	Presence of local staff champions to support/motivate peers and advocate for ePROM/ePREM usage
User-friendly software	ePROMs being used for comparative analysis within/between organisations	Integrating ePROMs/ePREMs into existing workflow routine, or reconfiguring workflow for integration	Buy-in of clinical staff	Engagement and involvement of stakeholders throughout process
Available in different languages	Educational resources to encourage and assist patients to use ePROMs	Staff or volunteers available to assist with and facilitate ePROM collection	Clinicians unsure how ePROMs can inform clinical decisions	Ongoing monitoring of implementation through regular audits, with feedback to users
Adaptive technology to trigger ePROMs/ePREM questionnaires	Patients lacking access to internet	Buy-in of leadership and management	Clinicians believe that ePROMs lack clinical validity and/or accuracy	Pre-implementation testing, especially of usability
Tablet computers available to patients at first point of contact	Patients frustrated with lack of feedback on ePROM results	Lack of electronic healthcare record with which ePROMs can be integrated	Clinicians believing ePROMs not suitable/relevant/valuable	Project managers/coordinators skilled in knowledge translation and facilitating practice change
Unreliable and unstable software or hardware	Patients preferring paper forms to electronic versions	Burden on staff facilitating the collection of ePROMs/ePREMs	Clinicians believe ePROMs duplicate clinical interview so are redundant	Standardised process (revised as new issues are identified) to streamline implementation for future sites
ePROMs/ePREMS too long, too repetitive or poorly timed	Patients with low technical literacy struggle to complete online surveys	Clinic visit cannot accommodate discussion of ePROM results (due to inappropriate equipment or lack of time)	Clinicians lack knowledge of ePROMs or ePROM content	
ePROMs/ePREMs too expensive, beyond available financial resources	Patients lacking time to complete ePROMs/ePREMs		Belief that ePROMs are outside the clinical scope of practice	

Table 1: Facilitators (green) and barriers (red) of implementing ePROMs/ePREMS across the 5 CIFR domains. For each domain, only the most commonly identified factors (i.e. those identified in the highest proportion of the included studies) are shown.

Study (Author, Year)	Country	Clinical Setting	Intervention	Quality Rating
Bhatt 2020	USA	Orthopaedics	ePROM	★
Biber 2017	USA	General hospital/clinic	ePROM	★
Chenok 2015	USA	Orthopaedics	ePROM	★
DeRosis 2020	Italy	General hospital	ePREM	★
Dronkers 2020	Netherlands	Oncology	ePROM	★★★★
Duman-Lubberding 2017	Netherlands	Oncology	ePROM	★★★★
Fredericksen 2016	USA	Community health	ePROM	★★★★★
Howell 2020	Canada	Oncology	ePROM	★★★
Krawczyk 2019	Canada	Palliative care	ePROM+ePREM	★★★★★
Kwan 2016	USA	General clinical practice	ePROM	★★★★
Li 2016	Canada	Oncology	ePROM	★★★
Papuga 2018	USA	Orthopaedics	ePROM	★★★
Rotenstein 2017	USA	Oncology	ePROM	★★★
Schepers 2017	Netherlands	Paediatric oncology	ePROM	★★★★
Spaulding 2019	USA	Psychiatry	ePROM	★★★★★
Teela 2020	Netherlands	General hospital	ePROM	★★★★
Trautmann 2016	Germany	Oncology	ePROM	★★★
Unsworth 2012	UK	Counselling/psychotherapy	ePROM	★★★★★
Zhang 2019	USA	Orthopaedic and oncology	ePROM	★★★★★

Table 2: Characteristics of included studies. Studies were considered to be of high quality when meeting 100% of the MMAT criteria, considerable quality with 80-99% of the criteria, moderate quality at 60-79%, low quality at 40-59%, and very low quality at <39%.

Results

The search process is outlined in Figure 1. A total of 19 articles were included in the final review, of which 6 studies were mixed methods, 2 cross-sectional studies, 9 qualitative research and 2 case reports. The most common clinical settings were oncology and orthopaedics, which made up 42% (8/19) and 21% (4/19) of the included studies respectively. Most studies only investigated the implementation of ePROMs (17/19), with only 1 study investigating ePREMs and 1 study investigating both ePROMs and ePREMs.

A total of 88 factors influencing the implementation of ePROMs or ePREMs were found in this review, including 36 barriers and 52 facilitators. Those facilitators and barriers most frequently identified in the review are presented, under the corresponding CFIR domains, in Table 1.

The two reviewers agreed on the quality assessment ratings 76% of the time, with a Gwet's agreement coefficient (AC1) of 0.72 (95% CI 0.63 to 0.81), indicating good agreement. The consensus quality assessment considered 5 studies as high quality, 5 as moderate quality, 5 as average quality and 4 as very low quality. The consensus quality assessment results are presented, as an overall rating for each study, in Table 2.

Discussion

The factors identified in this review can be used as a checklist

This review provides a list of facilitators and barriers extracted from the included studies. Although several of these factors have been identified in previous systematic reviews of staff perceptions of non-electronic PROMs and PREMs, this review uncovered many additional facilitators and barriers. These additional factors may be specific to electronic PROMs and PREMs, or may have resulted from this review's inclusion of studies investigating the perceptions of stakeholders other than staff (such as patients).

Limitations of this review include: a) most studies being from a few countries (US, Canada and Netherlands); b) most studies focusing on oncology and orthopaedic contexts; and c) few studies investigating ePREMs.

The list of facilitators and barriers in this review may be used as a checklist to assist in successfully implementing and maintaining ePROMs and ePREMs across health care settings.

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