

# Electronic patient reported outcome measures (ePROMs) for triaging and scheduling outpatient appointments: a systematic review and meta-analysis

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## Introduction

As healthcare costs continue to rise, there is a need for more efficient resource allocation that can utilize dynamic and real time data for appointment scheduling.

- ePROMs have the potential to optimise healthcare delivery by enabling more responsive and personalised patient management.
- One key area where this could be impactful is in outpatient scheduling where appointments could be adapted based on patient-reported data, ensuring timely interventions while improving resource utilisation.

## Methods

A comprehensive search was conducted using PubMed, Embase, and SCOPUS on 6 September 2023. The search strategy, constructed by a librarian, included variations of “patient-reported outcome measures” or “ePROM(s)”, “triaging” or “scheduling”, “appointments”, used singly and in combination. References in the included articles were hand searched.

### Eligibility Criteria

### Primary Outcome

### Secondary Outcome

**Randomised controlled trials** that compared use of ePROMs for flexible scheduling decision (intervention) with conventional standard scheduling (control) in adult outpatients with any chronic medical condition.

Differences in healthcare utilisation:

- Number of outpatient clinic visits
- Telephone consultations
- Unplanned visits between intervention and control arms

- Disease and symptom control
- Implementation outcomes
- Cost effectiveness
- Patient satisfaction
- Barriers to implementation

## Results

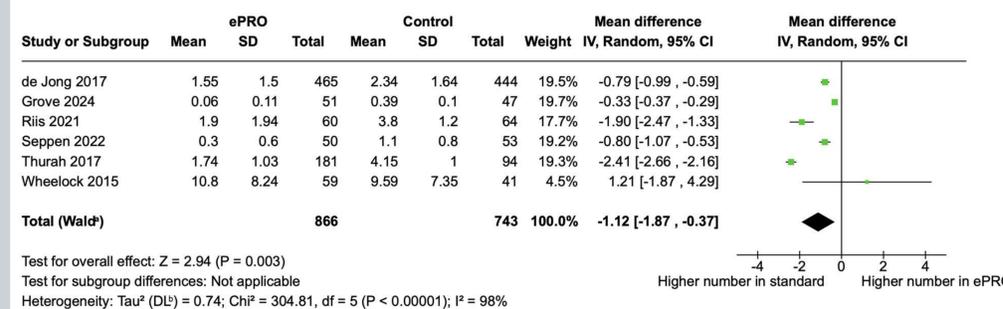
The search strategy yielded 3769 citations and 1 additional article from hand search. 17 randomised controlled trials (6469 patients) were included. Most studies focused on cancer (n=9).

6 out of 10 studies comparing the number of physical appointments showed that ePROMs significantly reduced the mean number of physical appointments, while 1 study reported increased appointments. A meta-analysis of six studies with sufficient data for pooling indicated that the ePROMs group had fewer appointments, with a mean difference of -1.12 (CI -1.87, -0.37).

Among 10 studies evaluating disease control, 2 showed improved disease control with ePROMs, 2 reported improved survival in cancer patients, while 6 found no significant differences. None of the studies have performed cost evaluation analysis. 3 studies suggested that ePROMs improve cost-effectiveness by enhancing the efficiency of patient-clinician interactions.

6 studies reported that patients who are not familiar with technology are less like to participate in use of ePROMs. Fear of commitment and cognitive impairment were also noted as obstacles.

### Meta-analysis of number of outpatient appointments:



### Consolidated Summary of Findings:

Outcome	No. studies comparing outcomes	No. favouring ePROM	No difference	No. favouring control
<b>Appointment and Consultation</b>				
Number of outpatient appointments	10	6	3	1
Number of telephone consultations	7	1	4	2
<b>Healthcare Utilisation</b>				
Number of emergency visits	7	3	4	0
Number of hospitalisations	6	1	5	0
<b>Patient Outcomes</b>				
Disease Control	10	4	6	0
Symptom Control	8	2	5	1
Patient satisfaction	4	0	4	0

## Discussion

Most studies in this review reported a significant reduction in outpatient visits associated with ePROMs. However, there was no significant impact on other healthcare utilisation measures such as emergency visits or hospitalisations, indicating they may not address all care needs.

Generalisation of these results should also take into account healthcare resource availability and population health-seeking behaviour. Studies included relied on manual human interaction to process ePROMs data; however, we believe that the ability to automate will be crucial for sustainability.

Limitations of the study include performance bias from the lack of blinding to groups using ePROMs, as well as the high heterogeneity across studies.

## Conclusion

- This review shows proof of concept that an ePROMs based flexible scheduling system is feasible and pragmatic.
- Future studies can investigate methods to improve efficiency, look at longer term sustainability, perform health economic analysis and explore various implementation outcomes at specific healthcare settings.
- The integration of ePROMs into electronic health records, incorporation of technology including wearable patient-generated data, artificial intelligence and automation in predictive analysis would like further improve the utility and sustainability of this system.