

# Cochrane review summary: smartphone and tablet self-management apps for asthma



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## Review question

Are smartphone and tablet computer apps feasible, effective and cost-effective tools for the self-management of individuals with asthma?

## Relevance to primary care and nursing

Primary health-care professionals including nurses are involved in the care and monitoring of all people with asthma. Government guidance emphasises the importance of education and self-management techniques to minimise adverse outcomes and improve asthma control (British Thoracic Society–Scottish Intercollegiate Guideline Network, 2012).

## Characteristics of the evidence

This Cochrane review contained two randomised controlled trials (RCTs) that included 408 participants who were clinically diagnosed with asthma in any care setting, or were individuals without a formal diagnosis but were a parent to, or a caregiver for, a patient with asthma (Marcano Belisario *et al.*, 2013). Included studies had to use a health app as the only means of delivering the intervention or where apps formed a part of a composite intervention. These included global system for mobile communication, wireless (eg, smartphones) and non-wireless (eg, personal digital assistants or tablet devices). Interventions needed to be

compared with other self-management interventions delivered using traditional or alternative methods (eg, paper-based diaries for asthma management). Excluded interventions were those targeting health professionals, did not focus on self-management, relied only on messaging short or multimedia messaging, used existing software on mobile phones (eg, asthma diaries), relied on devices using bespoke hardware or involved physical modification of hardware for intervention delivery and other interaction methods not comparable with smartphone or tables (eg, desk top computers, laptops, notebooks). The interventions were delivered by researchers and asthma nurses. One RCT was conducted in a hospital in Taiwan and the other one was a multicentre RCT involving 32 general practitioners (GP) practices in the United Kingdom. Outcomes were measured at short-term (within 30 days of intervention completion), medium-term (30 days to six months), or long-term (six months or more) follow-up.

## Summary of key evidence

Both studies were rated as low quality. Primary outcomes included symptom scores and health-related quality of life (QoL) measured using validated standard instruments, and service use for asthma exacerbations or complications [eg, frequency of planned and unplanned health-care visits – emergency department (ED), GPs, hospitalisations]. Secondary outcomes included time off school or work, adherence to intervention, satisfaction and acceptability (using validated scale), health economic measures (eg, length of stay, rates of readmission), lung function and adverse events

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(other than unplanned visits). Meta-analysis was not appropriate because of considerable heterogeneity. Mean difference (MD), risk estimates as odds ratio (OR) and 95% confidence intervals (CI), *P*-value and number of studies and participants are shown in parentheses for significant results.

## Primary outcomes

### Symptom scores

One study ( $n = 278$ ) found no statistically significant difference in Asthma Control Questionnaire scores between the intervention and control groups at six months.

### Service use at six months

Of two studies ( $n = 370$ ), one showed no evidence of effect on unscheduled visits to ED and in the other study, intervention participants were less likely to attend the ED than the control group (OR 0.20, 95% CI 0.04–0.99). There was no significant effect on hospital admissions (two studies,  $n = 370$ ) or GP consultations (one study,  $n = 281$ ). This study reported that intervention participants were less likely to attend unscheduled general practice nurse consultations than those in the control group (OR 0.60, 95% CI 0.37–0.98). No significant intervention effects were reported on out-of-hours visits (one study,  $n = 281$ ).

### Health-related QoL

One study ( $n = 89$ ) found significantly higher scores in the intervention group in both the mental and physical components of the SF-12 questionnaire than those in the control group (MD 6.00, 95% CI 2.51–9.49 and MD 5.50, 95% CI 1.48–9.52, respectively). There were no significant differences between the two groups in the Asthma Quality of Life Questionnaire scores.

## Secondary outcomes

There was no evidence of any significant effect on adherence to intervention. However, a significant effect was reported on total health-care costs [one study,  $n = 281$ ; MD (GBP) 70.00, 95% CI 19.98–120.02] and total cost of delivering trial interventions group [MD (GBP) 66.00, 95% CI 63.19–68.81], although nursing costs were marginally lower [MD

(GBP) –3.00, 95% CI –5.81 to –0.19]. Lung function measured as peak expiratory flow rate showed an incremental improvement in the intervention group, with a significant effect at four to six months (one study,  $n = 89$ , six months: MD 39.20, 95% CI 16.58–61.82) and a significant improvement in forced expiratory volume/second (MD 8.70, 95% CI 0.37–17.03).

No significant differences between the groups were reported on adverse events.

## Implications for practice

Use of smartphone apps in self-management of asthma is in its infancy. Patients reported good compliance and such devices have the potential to make self-management interventions more accessible and convenient.

However, methodological limitations and contradictory findings from only two studies suggest inadequate evidence to recommend their use in routine care.

## Implications for research

There is a need to establish the efficacy of apps both as standalone interventions and as part of complex interventions and to explore the relative contribution of the components. Theory-based interventions need to be developed to ensure that differential clinical management of patients between control and intervention groups is minimised. They need to consider strategies to improve adherence and evaluate the use of apps in high-quality studies to examine long-term outcomes, taking into account seasonal variation in asthma.

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## Conflicts of Interest

None.

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