Abstract

The Effect of Smartphone Interventions on Patients With Chronic Obstructive Pulmonary Disease Exacerbations: Systematic Review and Meta-Analysis

Meshari Alwashmi, BN, MSc; John Hawboldt, BSP, PharmD; Erin Davis, BScPharm, PharmD; Carlo Marra, BScPharm, PharmD, PhD; John-Michael Gamble, PhD; Waseem AbuAshour, MSc, PharmD

Memorial University, St. John's, NL, Canada

Corresponding Author:
Meshari Alwashmi, BN, MSc
Memorial University
230
Elizabeth Ave
St. John's, NL,
Canada
Phone:
Email: mfa720@mun.ca

Abstract

Background: The prevalence and mortality rates of chronic obstructive pulmonary disease (COPD) are increasing worldwide. Therefore, COPD remains a major public health problem. There is a growing interest in the use of smartphone technology for health promotion and disease management interventions. However, the effectiveness of smartphones in reducing the number of patients having a COPD exacerbation is poorly understood.

Objective: To summarize and quantify the association between smartphone interventions and COPD exacerbations through a comprehensive systematic review and meta-analysis.

Methods: A comprehensive search strategy was conducted across relevant databases (PubMed, Embase, Cochrane, CINHA, PsycINFO, and the Cochrane Library Medline) from inception to October 2015. We included studies that assessed the use of smartphone interventions in the reduction of COPD exacerbations compared with usual care. Full-text studies were excluded if the investigators did not use a smartphone device or did not report on COPD exacerbations. Observational studies, abstracts, and reviews were also excluded. Two reviewers extracted the data and conducted a risk of bias assessment using the US Preventive Services Task Force quality rating criteria. A random effects model was used to meta-analyze the results from included studies. Pooled odds ratios were used to measure the effectiveness of smartphone interventions on COPD exacerbations. Heterogeneity was measured using the I(2)statistic.

Results: Of the 245 unique citations screened, 6 studies were included in the qualitative synthesis. Studies were relatively small with less than 100 participants in each study (range 30 to 99) and follow-up ranged from 4-9 months. The mean age was 70.5 years (SD 5.6) and 74% (281/380) were male. The studies varied in terms of country, type of smartphone intervention, frequency of data collection from the participants, and the feedback strategy. Three studies were included in the meta-analysis. The overall assessment of potential bias of the studies that were included in the meta-analysis was “Good” for one study and “Fair” for 2 studies. The pooled random effects odds ratio of patients having an exacerbation was 0.20 in patients using a smartphone intervention (95% CI 0.07-0.62), a reduction of 80% for smartphone interventions compared with usual care. However, there was moderate heterogeneity across the included studies (I(2)=59%).

Conclusions: Although current literature on the role of smartphones in reducing COPD exacerbations is limited, findings from our review suggest that smartphones are useful in reducing the number of patients having a COPD exacerbation. Nevertheless, using smartphones require synergistic strategies to achieve the desired outcome. These results should be interpreted with caution due to the heterogeneity among the studies. Researchers should focus on conducting rigorous studies with adequately powered sample sizes to determine the validity and clinical utility of smartphone interventions in the management of COPD.

(iproc 2017;3(1):e6) doi:10.2196/iproc.8358

KEYWORDS

meta-analysis; systematic review; telemedicine; pulmonary disease; chronic obstructive pulmonary disease; ehealth; mhealth; chronic disease

Multimedia Appendix 1

Full poster.

[PDF File (Adobe PDF File), 150KB - iproc_v3i1e6_app1.pdf]

Edited by T Hale; This is a non-peer-reviewed article.submitted 05.07.17; accepted 22.08.17; published 22. 09.17

Please cite as:
Alwashmi M, Hawboldt J, Davis E, Marra C, Gamble JM, AbuAshour W
The Effect of Smartphone Interventions on Patients With Chronic Obstructive Pulmonary Disease Exacerbations: Systematic Review and Meta-Analysis
iproc 2017;3(1):e6
URL: http://www.iproc.org/2017/1/e6/
doi:10.2196/iproc.8358
PMID: