Digital Health Interventions for Diabetes Self- Management Education/Support in Type 1 & 2 Diabetes Mellitus

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Abstract. **Introduction.** Diabetes Mellitus is a major global concern. DSME (Diabetes Self-Management Education and Support) helps improve outcomes. Over the years, newer technologies have delivered DSME warranting an update of evidence. **Objectives**: Describe current digital health interventions employed in DSMES and their effectiveness in improving glycemic control and quality of life of Diabetes Mellitus (DM) patients compared to usual care. **Methods**: Systematic review design and meta-analysis. We will search data from 2010 to 2019. The review will only include randomized control trials (RCTs) with digital health interventions (mobile health, social media, e-health) as the main intervention to deliver DSMES. **Expected Results**: We expect digital health intervention-led DSMES to improve target outcomes compared to usual care. This study will aggregate information on usage and challenges for these tools. It will also suggest the direction of effect of such tools in different populations.

Keywords. Diabetes Self-Management Education and Support,

1. Introduction

Diabetes Mellitus is a major global concern and a costly disease. Currently, Diabetes Mellitus is a top ten global killer of humans. One method to improve outcomes and reduce costs is Diabetes Self-Management Education and Support (DSMES). DSMES also helps in preventing occurrence of complications. Ideally, quality DSMES should be easily accessible, however, its availability varies with different health systems. Digital health interventions help to solve these challenges with varying success. In addition, continuous digital innovations warrant up-to-date evidence for digital health interventions in DSMES. Therefore, we aim to know: What digital health interventions are being used in DSMES to improve glycemic control, Diabetes knowledge and health-related quality of life (HrQoL) for people with T1DM and T2DM in the past 10 years? & What is the effectiveness of digital health interventions for DSMES in improving glycemic control, Diabetes knowledge and HrQoL as compared to usual care for people with T1DM and T2DM in the past 10 years?

2. Methods

Design will be systematic review and meta-analysis. The study framework and reporting will be done in accordance to Preferred Reporting Instrument for Systematic Review and Meta-Analysis (PRISMA). We will search literature from the following databases: PubMed, EMBASE, Cochrane Library, Web of Science and Scopus. The review will only include randomized control trials (RCTs) published between 2010 and 2019 comparing digital health interventions delivering DSMES to usual care focusing on glycemic control, HrQoL and Diabetes Knowledge. Studies targeting other populations apart from confirmed Type 1 and 2 DM patients will not be included. In this review, healthcare that does not include use of digital health interventions will be considered as usual care. Protocol is registered on PROSPERO CRD42019139884. Articles are going to collected into Endnote X9. Studies will be screened against the eligibility criteria when looking at the titles and abstracts. Full text review will be done by two reviewers with disputes resolved through consensus.

Table 1: Proposed study variables that may help explain effect of digital health interventions on outcomes

Population	Interventions	Study	Outcomes
Age, sex, sex ratio, ethnicity, sample size, country, education level, disease type, duration of disease	Digital category Description Length Frequency Follow-up time	Setting Design Theoretical framework Comparison Author Journal Year of publication	HbA1c HrQoL Knowledge Instruments used Scales used

We will adapt Cochrane Collaboration's data extraction form. Missing information will be sought through emails. Differences will be resolved through consensus or consulting a third reviewer

1.1 Analysis

Variables will be summarized using descriptive statistics. We will use Cochrane Risk of Bias (ROB)-2 tool for parallel and cluster randomized studies. Assessment will be done independently by two reviewers, reaching consensus on differences. Random effects meta-analysis will be performed according to Diabetes type, digital health intervention route at various time points using Comprehensive Meta-Analysis Software Version 3 (Biostat, USA). Outcomes will be collected in one measuring unit or be aggregated using standardized mean difference. Qualitative analysis will assess acceptability & feasibility of digital interventions. Findings from subgroup analysis and meta-regression will help explain interaction of study variables with outcome estimates. The above will considered of great clinical importance. Publication bias will assess across studies.

2. Expected Results

We expect digital health intervention-led DSMES to improve target outcomes as compared to usual care. This study is expected to aggregate information on common usage and challenges for these tools. It will also inform us the direction of effect of such tools in different populations and environments. This study will be an addition to literature in support of Sustainable Development Goal 3 in the fight against non-communicable diseases and in ensuring universal health coverage.