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Review article

Diabetes self-management education for adults with type 2 diabetes mellitus: A systematic review of the effect on glycemic control

Carole A. Chrvala^a, Dawn Sherr^{b,*}, Ruth D. Lipman^b

^aHealth Matters, Inc., Chapel Hill, NC, USA

^bAmerican Association of Diabetes Educators, 200 W. Madison Street, Chicago, IL 60606, USA

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ABSTRACT

Objective: Assess effect of diabetes self-management education and support methods, providers, duration, and contact time on glycemic control in adults with type 2 diabetes.

Method: We searched MEDLINE, CINAHL, EMBASE, ERIC, and PsycINFO to December 2013 for interventions which included elements to improve participants' knowledge, skills, and ability to perform self-management activities as well as informed decision-making around goal setting.

Results: This review included 118 unique interventions, with 61.9% reporting significant changes in A1C. Overall mean reduction in A1C was 0.74 and 0.17 for intervention and control groups; an average absolute reduction in A1C of 0.57. A combination of group and individual engagement results in the largest decreases in A1C (0.88). Contact hours ≥ 10 were associated with a greater proportion of interventions with significant reduction in A1C (70.3%). In patients with persistently elevated glycemic values (A1C > 9), a greater proportion of studies reported statistically significant reduction in A1C (83.9%).

Conclusions: This systematic review found robust data demonstrating that engagement in diabetes self-management education results in a statistically significant decrease in A1C levels.

Practice implications: The data suggest mode of delivery, hours of engagement, and baseline A1C can affect the likelihood of achieving statistically significant and clinically meaningful improvement in A1C.

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* Corresponding author at: American Association of Diabetes Educators, 200 W. Madison Street, Suite 800, Chicago, IL 60606, USA. Fax: +1 312 424 2427.

E-mail addresses: cchrvala@centurylink.net (C.A. Chrvala), dsherr@aadnet.org (D. Sherr), rlipman@aadnet.org (R.D. Lipman).

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1. Introduction

Current estimates suggest that almost 50% of people with diabetes do not achieve and sustain the recommended target of <7.0% for glycated hemoglobin (A1C) [1] and only 14.3% are at target goals for A1C, blood pressure, low-density lipoprotein cholesterol, and nonsmoking [2]. The American Diabetes Association 2015 Standards for Care as well as the American Association of Clinical Endocrinologists recognize diabetes self-management education (DSME) as an integral aspect of the care for people with diabetes [1,3] in concert with pharmacotherapy that can involve multiple medications and dosing algorithms [3]. Nonetheless, recent studies estimate that among those newly diagnosed with diabetes, less than 7% of individuals with private insurance [1] and less than 5% of those covered by Medicare [4] actually participate in DSME. Thus, although the systematic review work by Norris and colleagues [5,6] indicated that DSME resulted in clinical improvement, it appears to be an underutilized element of diabetes care. Notwithstanding the potential of tight glycemic control to reduce complications [7], heightened awareness that tighter glycemic control with antihyperglycemic medication can be associated with increased risk of hyperglycemia [8] suggested that a current review of the potential for clinical benefit from DSME which examined DSME characteristics of DSME interventions to explore which, if any were associated with efficacy, was warranted.

The National Standards for Diabetes Self-Management Education and Support define diabetes self-management education as a collaborative and ongoing process intended to facilitate the development of knowledge, skills, and abilities that are required for successful self-management of diabetes [9]. Alternatively termed diabetes self-management training or DSMT, for clarity, DSME will be the term used in this paper. Evidence from randomized controlled trials and observational studies suggest that DSME is cost-effective [10,11] and associated with favorable changes in knowledge [12–16], clinical outcomes [13,14,16–18], self-efficacy and other psychosocial outcomes [16,19–21], screening for complications [15,22], risk factors for cardiovascular events [22,23], and quality of life [22,24]. However, the association between DSME and improvements in clinical endpoints and patient-centered outcomes has not consistently been shown in clinical trials or systemic reviews [5,6,17,25–29]. Differences in the methods and providers of DSME [30], duration and intensity of interventions, educational setting, demographic and clinical characteristics of DSME recipients [30], and variations in the quality of the research are proposed as factors that may contribute to these inconsistent results [5,6,27,31,32]. While lending itself to systematic review, this diversity of engagement is a hindrance to meta-analysis.

This is a systematic review of published, randomized controlled trials to evaluate the impact of DSME compared with usual care or a minimal educational intervention on A1C levels in adults diagnosed with T2DM. Because glycemic control has been shown to strongly predict the microvascular and macrovascular complications of diabetes [7], we chose A1C as the clinical endpoint of this study. We assessed changes in A1C levels that might be attributed to the mode of delivery, provider type, duration, and baseline A1C.

2. Methods

2.1. Data sources

Our research protocol was reviewed and approved by the members of the 2013 Research Committee of the American Association of Diabetes Educators (AADE). Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines were followed [33] with the PICOS framing. Only studies published in peer reviewed journals were included.

2.2. Search strategy

We searched MEDLINE accessed through PubMed, the Cumulative Index to Nursing and Allied Health Literature, EMBASE, Educational Resources Information Center, and PsycINFO. Our search strategy used the National Library of Medicine Medical subject headings including “type 2 diabetes,” “self-care education,” “self-management,” and “behavior change.” We reviewed the titles and abstracts (when available) of articles identified by the systematic search as potentially relevant to evaluation of DSME. All articles considered potentially relevant were retrieved and reviewed for inclusion in this review.

Our search included English-language articles published from January 1, 1997 through December 31, 2013. January 1, 1997 was selected as the search initiation date because this was the year that Congress authorized Medicare coverage of outpatient diabetes self-management training in the Balanced Budget Act of 1997 which resulted in Medicare coverage for up to 10 hours of DSME in the first year of engagement. The systematic database searches were supplemented with manual searches of citations from relevant reviews, systematic reviews, and meta-analyses because searches of online databases can be incomplete [34].

2.3. Study selection

This systematic review included was restricted to randomized controlled trials (RCT), which are associated with optimal validity and inference about causal relationships [35]. Our review was limited to studies that included participants 18 years or older, with any A1C level, all intervals of diabetes duration, and any comorbid health conditions because it is not uncommon for people with diabetes to be managing multiple conditions. In an effort for this to be as comprehensive review as possible, trials enrolling participants with type 1 and type 2 diabetes mellitus were included if results were reported separately for participants with T2DM or if the percentage of participants with type 1 diabetes was less than 50% of the sample. DSME interventions provided in any setting, by any method or provider, for any duration and contact time were eligible for inclusion, though not every study reported on each of these elements. However, because A1C was the clinical endpoint of the review, to be eligible, studies were required to report outcomes for A1C level.

Studies eligible for inclusion were also required to meet the definition of DSME defined by the National Standards for Diabetes Self-Management Education and Support [9]. This definition is not

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