Technology-Enabled Diabetes Self-Management Education & Support

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Introduction

There are approximately 30,000 diabetes educators in the United States. The American Association of Diabetes Educators (AADE) is the leading organization supporting both educators and people with diabetes. In 2016, in recognition of the inadequate reach of diabetes self-management education and support (DSMES) services, continued poor national outcomes in achieving an A1C (average blood glucose over 2-3 months) of less than 7% (ADA goal) and a disproportionate number of people living with diabetes compared to the number of diabetes educators, the AADE convened a technology workgroup to address these issues. The workgroup was composed of technology-engaged educators, people with diabetes, practice and technology providers and was charged with exploring the current technology landscape for diabetes self-management education and ongoing support.

Methods

The AADE Technology Workgroup systematically evaluated the diabetes landscape from the perspective of educators, people with diabetes, and the association. The group assessed the impact that consumer and healthcare technologies were having on the practice of diabetes self-management education, care, and ongoing support. Diabetes care devices, healthcare technology services, the internet of things (IoT), and the regulatory, security, and privacy areas of concern were considered.

Additionally, the group conducted a literature review to determine the state of evidence for technology-enabled diabetes self-management education and support. A systematic review of high quality reviews and meta analysis was conducted. Papers were included if published between January 2013 and January 2017. Twenty-five of the 265 papers evaluated were included for analysis. The majority evaluated the use of mobile phones and secure messaging. The studies were also evaluated for how they addressed the AADE7 Self-Care Behaviors™.

DIABETES TECHNOLOGY SOCIETY
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Results

AADE TECHNOLOGY FRAMEWORK

Based on Architecture for Integrated Mobility Framework (AIM)

This infographic identifies the technology domains beyond diabetes devices that are integral to educators interacting with patients and the health care environment. This includes consumer devices, apps, digital health, social media, and telemedicine platforms as well as services.

SYSTEMATIC REVIEW OF REVIEWS OF TECHNOLOGY-ENABLED DIABETES EDUCATION & SUPPORT

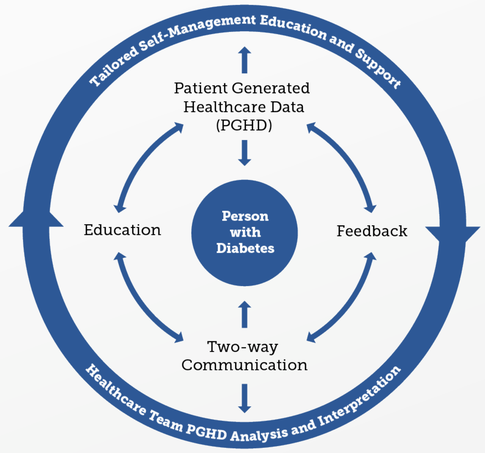
Table 3. Intervention Features of Studies With Significant A1c Outcomes (n = 18).

Review	Intervention features				
Author[a,b]	Communication (1- or 2-way)	Patient-generated health data (tracking or analysis)	Education content (general or customized)	Feedback (automated or live)	A1c[c]
Garabedian	2	Analysis	Both	Automated	−0.8% decrease[d]
Cui	2	Analysis	Both	Both	−0.4% diff
Alharbi	2	Both	Both	Both	−0.5% diff
Bonoto[b]	2	Both	Both	Both	−0.4% diff P < .001
Greenwood	2	Both	Both	Both	−0.2 to −1.2 range[e]
Hou	2	Both	None	Both	−0.5% diff
Kuo	Both	Both	Both	Both	−0.5% diff
Pal[b]	Both	Both	Both	Both	−0.2% diff P = .009
					Mobile: −0.5% diff P < .00001
Pereira	Both	Both	Both	Both	Significant[f]
Saffari[b]	Both	Both	Both	Both	−0.5% diff P < .001
					SMS and Internet: −0.9% diff P < .001
Tao[b]	Both	Both	Both	Both	−0.3% diff P < .00001
					Mobile: −0.4% diff. P < .00001
Wu	Both	Both	Both	Both	−0.5% diff
					T2D: −0. 7% diff
Toma[b]	Both	Both	General	Both	−0.5% diff P < .00001
Kitsiou	Both	Tracking	General	Both	T2D: 0.8% decrease[d]
					T1D: −0.3% decrease[d]
Or[b]	Both	Tracking	General	Both	−0.3% decrease[d] P < .001
Zhai[b]	Both	Tracking	General	Both	−0.4% diff
Hamine	Both	Tracking	None	Live	11/26 studies[g]
Peterson	Both	Tracking	None	None	7/15 studies[g]
					−0.6% to −0.8% range[e]

Abbreviations: Diff, difference-between intervention and control; SMS, text messaging; T1D, type 1 diabetes; T2D, type 2 diabetes.
[a]Authors ordered from most features to least features.
[b]Items signify a meta-analysis.
[c]A1c was not reported consistently in reviews; P values are included if they were reported.
[d]Decrease means there was a decrease in A1c reported.
[e]Range refers to the range of A1c difference reported.
[f]Significant means authors did not specify an A1c level.
[g]Studies indicates the number of studies reporting significant A1C.

Eighteen of 25 reviews reported significant reduction in A1c as an outcome measure. Four key elements emerged as essential for improved A1c.

TECHNOLOGY-ENABLED SELF-MANAGEMENT FEEDBACK LOOP (TES)©



Technology-enabled diabetes self-management solutions significantly improve A1c. The most effective interventions incorporated all the components of a technology-enabled self-management feedback loop that 1) connects people with diabetes and their health care team using 2-way communication, 2) analyzes patient-generated health data, and provides 3) tailored education, and 4) individualized feedback. Most studies described healthy eating, being active, monitoring glucose, and medication taking as the primary self-care behaviors included in the interventions.

Conclusions

The AADE Technology Framework provides a strategic view for the association to advance the inclusion of all aspects of technology-enabled education, care, and support in advancing the practice and role of education in prevention and management of chronic disease. The TES framework demonstrates the critical components that are essential for the design and evaluation of digital tools that impact outcomes .

References

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