

Does human coaching and technology modality impact effectiveness of digital health interventions for diabetes?

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Background

While digital health interventions for the management of diabetes have rapidly proliferated, there remains uncertainty about which types of coaching and/or digital technologies are more effective. Digital technologies can include text messaging, email, phone-based or videoconference platforms, websites or portals, and smartphone apps. Types of coaching can include synchronous communication, such as real-time phone calls and video calls, or real-time communication via smartphone app chat; and asynchronous communication, such as text messages, emails and web portals. Coaching can also differ in intensity of support, with high intensity involving frequent, personalised, data-driven coaching, compared to low intensity coaching, which is delayed, generic, and infrequent. The aim of this evidence summary is: Does human coaching and technology modality impact effectiveness of digital health interventions for diabetes?

Literature search

How did we answer this question?

This evidence summary uses a non-systematic approach, rapidly reviewing the most relevant, recent, and high-quality evidence to answer this question. The evidence is reviewed alongside one academic expert and one content expert, to produce a brief evidence summary that is “good enough” to inform health services of relevant topics.¹ This document alone is not sufficient to solely inform decision-making.

Findings

Does effectiveness of digital health interventions differ based on technology?

Overall, digital health technologies for diabetes management demonstrate statistically significant improvements in glycaemic control compared to usual care.^{2,3} Meta-analyses showed an overall difference in HbA1c reduction of -0.30% (95% CI -0.42 to -0.19) across all technology types. However, the amount of HbA1c reduction varied considerably based on digital type:

Smartphone: Smartphone apps demonstrated highest levels of effectiveness, particularly when integrated with glucose monitoring devices and personalised feedback systems (HbA1c reduction of -0.42% [-0.63 to -0.20]).

SMS: Text messaging systems showed moderate effectiveness (HbA1c reduction of -0.37% [-0.57 to -0.17]), with benefits primarily in medication reminders, appointment scheduling, and basic glucose monitoring

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support. However, standalone SMS interventions demonstrated limited sustained impact on long-term glycaemic control compared to usual care.

Web-based: Websites and portals did not show effectiveness in reducing HbA1c (HbA1c reduction of -0.09% [-0.64 to 0.46]).

In addition to differences in effectiveness amongst digital technology types, smartphone apps displayed the greatest reach, whereas web-based interventions had greater uptake.

What are the comparative effects of coaching?

In research that has looked at the effects of coaching, defined as a combination of both education and directive support, overall, intensity of human coaching was directly related to improvement.³ In other words, access to self-measured data alone, without coaching, does not improve glycaemic control.

High intensity coaching includes personalised motivational and goal-setting components based on the most recent data, delivered by dedicated health care professionals. Communication happens regularly, either in person or remotely, at least once per week. Education includes specific modules explaining disease, behavioural strategies, and psychological coping. Duration of coaching session and duration of coaching overall varied significantly. High intensity coaching resulted in the largest improvements across studies (HbA1c reduction of -0.45% [-0.81 to -0.09]).

Moderate intensity coaching includes personalised advice based on individual data but does not include behavioural advice in terms of motivational and goal-setting components. The communication is ad hoc and initiated by health care professionals. Education includes general information about the disease and technical information about the use of continuous glucose monitoring devices. Moderate intensity coaching resulted in improvements across studies (HbA1c reduction of -0.28%).

Low intensity coaching is where data sharing between the patient and clinician is limited, and feedback is generic, often using preexisting templates. The communication is asynchronous or delayed (eg, email or follow-up phone call). There is limited or no education. This form of coaching did not result in significant reductions in HbA1c.

Further key points around the impact of coaching in diabetes management include:

1. When comparing intensity of human coaching, the digital technology (e.g. ??? smartphone, web-based) used to deliver the coaching did not appear to be important.³
2. The qualification level of coaches was much less important than proper training in intervention protocols.³
3. Further research has shown in addition to improvements in glycaemic control, human coaching may also improve depression symptoms and medication adherence, although the evidence is mixed.⁴
4. When studies are grouped by communication modes, rather than intensity of coaching, asynchronous communication modes (i.e., text messages, emails) demonstrated superior effectiveness compared to synchronous communication (i.e., phone calls, video conferencing). This finding is counterintuitive, and may stem from practical constraints, in that the availability of the coaches for direct contact is limited by ratios and the amount of time each coach was available. Conversely, asynchronous communication allows for near-real-time communication without the logistic constraints, meaning more support may be provided. More work is needed to understand how intensity of coaching and communication modes interact.
5. Exploratory work has begun to investigate how artificial intelligence-based coaching can be leveraged, for example, in digitally delivered diabetes prevention,^{5,6} but there is no conclusive findings yet.

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What does this mean for health services?

- Overall, the evidence shows that key success factors are smartphone app-based interventions, combined with automatic data uploading and human coaching.
- Higher-intensity interventions requiring dedicated healthcare provider support may face implementation barriers in resource-constrained settings such as rural and regional areas, and a resources trade-off. Health services could implement tiered intervention approaches, reserving high-intensity digital interventions for patients with highest needs and/or challenges with engagement, and leveraging medium-intensity interventions for stable patients requiring maintenance support.

Limitations

- Most studies had relatively short time horizons of less than nine months, which means these findings may not be reflective of the true effectiveness of each component.
- The data is primarily from the US and to a lesser extent, Europe and Asia which has a different healthcare system context, with no data from Australian settings.
- Significant variation in intervention components, duration, and outcome measurements limits direct comparisons between modalities.

References

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- Designs and tests the best way to deliver these services, so that home-based healthcare services will continue to grow and improve across the region and beyond
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