

Diabetes healthcare and mobile technology: Panacea or a false dawn?

In this section, a panel of multidisciplinary team members give their opinions on a recently published paper. In this issue, we focus on whether the use of mobile applications for diabetes self-management has been beneficial to people with diabetes in improving their self-care. A patient perspective has also been presented.

Mobile applications for diabetes self-management: Status and potential

El-Gayar O, Timsina P, Nawar N, Eid W (2013) *J Diabetes Sci Technol* 7: 247–62

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Mobile applications have a potential role in diabetes self-management

- 1 Advances in smartphone technology and wireless network connectivity have resulted in the rapid increase in mobile applications (“apps”) for diabetes self-management.
- 2 The study authors reviewed the literature to determine whether mobile apps have improved self-management for individuals with type 1 or type 2 diabetes and to identify any issues that need to be overcome for their widespread use.
- 3 The authors reviewed diabetes self-management apps that are commercially available and

performed a literature search to identify peer-reviewed articles published between January 1995 and August 2012 on the use of mobile apps supporting diabetes self-management; in total, 71 apps and 16 articles were included in the final review.

4 Of the commercially available apps, 39% (27/71) supported self-management strategies, such as physical exercise, timely insulin dosage or medication, frequent blood glucose testing and a healthy diet.

5 Of the articles identified, 38% (6/16) supported all four task outlined above; additional self-management strategies identified in the literature included self-management education, weight management, blood pressure monitoring, communication with clinicians, decision support, notification/alert, tagging of input data and integration with social media.

6 Fifteen out of the 16 articles experimentally tested the app studied; two articles found the app provided no added benefit, whereas the others reported some benefit of mobile app use.

7 Overall, the review highlighted the potential for mobile apps to have a positive effect on diabetes self-management; additionally, app usage was associated with improved attitudes to self-care.

8 Limitations of mobile apps include lack of personalised feedback, usability issues and integration with health records.

9 The adoption of user-centred sociotechnical design principles is needed to improve usability for widespread adoption of the technology.

10 Efficacy and usage of mobile apps for diabetes self-management would benefit from a holistic approach to individuals' care.

“There is no doubt that mobile applications could turn out to be a useful adjunct to diabetes management, but there are a number of areas that perhaps need to be overcome before such an approach will be embraced by the majority, let alone universally.”



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As we venture further into the 21st century, the pace of technological advancement has continued at a near exponential rate. Not surprisingly, the healthcare arena, especially concerning chronic disease, has looked at using this added tool to help further the cause of improving the healthcare of the populace. Diabetes is a particular healthcare issue where self-management is one of the cornerstones of “intervention”, and this review article highlights the plethora of mobile applications (“apps”) targeting such an approach.

There is no doubt that mobile apps could turn out to be a useful adjunct to diabetes management, but there are a number of areas that perhaps need to be overcome before such an approach will be embraced by the majority, let alone universally. For starters, mobile apps for diabetes self-management need to show an improvement in outcomes for the individuals concerned, and, as mentioned by the authors, the results have been mixed at best. A bigger

obstacle perhaps lies in the adoption of such an approach by healthcare professionals. There is a significant amount of scepticism to such an approach in a system that has primarily based itself on face-to-face contacts between healthcare professionals and patients. There is variable uptake of direct email contact between professionals and patients, and thus a wholehearted embrace of mobile technologies will take, perhaps, a significant amount of time.

One of the biggest areas of concern continues to be “confidentiality” of sensitive patient information; any such app, especially one that endeavours to synchronise with hospital records and patient databases, needs to have patient confidentiality as robust as possible.

Thus, in summary, a combination of professional reluctance to embrace something “different”, scepticism about its clinical efficacy or indeed a genuine concern about confidentiality will perhaps hold back the integration of modern technological advancement in the local healthcare system.

Having said that, this is not something that can be ignored, especially in light of the estimated number of

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people who will be using mobile healthcare apps. Self-management continues to be the cornerstone, and such technology can be a useful, if not vital, adjunct to existing education programmes. The patient demographic also needs to be borne in mind, as this includes individuals who refer to their mobile phone for information at the slightest opportunity. Thus mobile apps that give individuals the opportunity to interact with healthcare programmes, review their own dataset and perhaps even access healthcare professionals for advice have to be factored into any future planning of healthcare delivery.

Some good examples of mobile apps can be seen locally in DiAppBetes and Appy Feet. DiAppBetes primarily targets healthcare professionals, but giving individuals with diabetes the opportunity to monitor their blood glucose, treatment regimens and so on seems like the next logical system. Appy Feet similarly looks at advancing the care of individuals with diabetic neuropathy and perhaps even challenging the healthcare professional to move past the *status quo* and consider the next evidence-backed, NICE-endorsed medication.

In summary, the pros do indeed outweigh the cons of mobile healthcare apps. However, it is up to us as professionals to accept the inevitable progression of technology and embrace it with the intent to innovate, rather than simply following the age-old tradition of reviewing individuals in an outpatient clinic setting. There is no question, however, that robust clinical trials are needed to demonstrate a genuine benefit of mobile apps in healthcare outcomes, rather than them being an intervention based on anecdotes or championed by “technology evangelists”.

Beyond everything, perhaps we need to be more open and receptive to individuals’ needs, understanding that for some people with busy lives it may be easier to use mobile apps to tackle self-management rather than attend a 2- or 3-day programme on diabetes self-management. In that quest, if mobile technologies offer us a useful adjunct then that is to be welcomed, albeit with cautious optimism.

“So where does this paper leave us? Certainly it highlights the profusion of self-management mobile apps – some of their benefits and some of their failings – but it leaves many questions about where such tools might head and why.”



Simon Saunders, Consultant in Diabetes and Endocrinology and Clinical Lead in Unscheduled Medicine, Warrington and Halton NHS Foundation Trust

This paper by El-Gayar and colleagues offers a succinct appraisal of the current availability and value of a variety of diabetes self-management tools. It is a well-thought-through paper, in that it attempts to assess the usefulness of mobile applications (“apps”), from both an individual’s and a healthcare professional’s viewpoint. The inclusion of each app’s ability to measure and record a range of self-management tasks as a feature of its functionality, as well as the possibility of data transfer to healthcare professionals or to a personal health record in the table of results presented in this review, enables us to see what these tools really do offer to individuals with diabetes and healthcare professionals alike.

And what do these apps offer us all? Is there anything to be gained in using such tools over judicious use of the blood glucose meter or a paper record of the results, or both? Again, the paper attempts to clarify this by detailing any reported results. In those apps that have been studied and outcomes published, there have been moderate improvements in diabetes self-management; however, these are not the apps that are usually seen in the app stores for smartphone users. I would argue, though, that these mobile apps offer nothing more than could be gained from using a blood glucose meter and

a sensible discussion of the data between the individual and diabetes healthcare professional.

Smartphones are widely used and do provide an opportunity for multiple apps to aid self-management. Apps that function within the phone as a meter, directly uploading a blood glucose reading through an attachment and then enabling emailing of these data, apps that measure heart rate and exercise and apps that record or offer carbohydrate advice are all available and being used by people with diabetes. I have had individuals report an intrinsic value in such apps to me, stating that they help with motivation and understanding. On the other hand, individuals have also reported “data-entry fatigue”, and consequently they give up using them and return to a simple blood glucose meter.

So where does this paper leave us? Certainly it highlights the profusion of self-management mobile apps – some of their benefits and some of their failings – but it leaves many questions about where such tools might head and why. Individuals with diabetes who are motivated to record blood glucose in the first place and then interested enough to want to act upon the results are the ones who use, and potentially gain, from mobile apps.

The key for healthcare professionals involved in diabetes care is to engage with the individual and facilitate appropriate education, skills and motivation to use blood glucose readings as a tool to take their care forward. How people choose to do this will remain as individual as people themselves.

A patient’s perspective

“Improving our ability as people with diabetes to self-manage has significant costs and benefits for all health and social-care budgets across the world. This is an area that all governments should be actively working on: maximising the opportunities for people with diabetes and their care teams to reduce costs and improve outcomes.”



Paul Buchanan, founder of www.gbdoc.co.uk, a diabetes online community (#gbdoc), and founder of team blood glucose, www.teambloodglucose.com, a not-for-profit social enterprise

There are three key areas I’d like to discuss from a patient’s perspective on the plethora of mobile applications (“apps”) now available to people with diabetes, all touting a message of “helping” us manage the life-long chronic condition that is diabetes: regulation; connectivity; and ease of use.

Taking them in reverse order, the first and perhaps the most important to people with diabetes and their carers is: just how easy is the app to use? Most apps are either free or very low cost, and the functionality and ease of use is reflected in the price. The best, in my view, are shockingly basic and the worst are no better than a spreadsheet, so my call to the industry and app developers is to make the type of investment you would expect a bank to make in developing a mobile finance app – take it seriously, our health is not a game. Get it right and the potential market is certainly big enough to warrant the investment.

Having said that, a number of apps are now past the “version 1.0” stage, and with time they should improve; I look forward to reviewing them as they become available.

Connectivity is a simple ask – make my app talk to my meter, pump and continuous glucose monitoring device, have them all talk to my smartphone and make all of my data accessible to me, wherever I am, through a secure cloud-based platform. Banks can do it, utility companies can do it, in fact pretty much everyone else can do it except healthcare – why is that?

Collaborate, create standards and lobby regulators to distinguish between what is a medical device and what is an application.

In terms of regulation – I travel and the management of my diabetes is a data-driven exercise; without my data I cannot make decisions about my therapeutic needs. Regulators need to understand that my collection of data needs to travel with me, unhindered, and that both my healthcare team and I need access to my data, wherever they are or wherever I am.

Improving our ability as people with diabetes to self-manage has significant cost benefits for all health- and social-care budgets across the world. This is an area that all governments should be actively working on: maximising the opportunities for people with diabetes and their care teams to reduce costs and improve outcomes.