

What can apps offer in diabetes care?

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Mobile health technology (mHealth) has seen an explosion in growth in recent years fuelled by the popularity of smartphones. There are now over 100 000 mHealth apps in existence. This short article explores how these apps may potentially help people with diabetes, the means by which clinicians can assess apps for suitability, and the need for more evidence.

Smartphones have become an important part of our daily life. According to a 2014 report from Deloitte, two in three UK adults, or 35 million people, now own a smartphone. Between 2013 and 2014, the biggest rise was in the 55-years-and-over age group (Deloitte, 2014). The Deloitte report also shows that about one in six of us look at our phones more than 50 times a day and a third of us look at our phones within 5 minutes of waking.

Globally, smartphones have created a multi-billion pound app market. Apple opened its app store in 2008 to allow access to a range of apps developed by third-party programmers. Other platforms, such as Android, Blackberry and Windows, followed with their own app stores. Since then, apps have become part of everyday life and health apps are no exception.

The number of mobile health technology (mHealth) apps that are published on the two leading platforms, iOS and Android, has more than doubled in only 2-and-a-half years. There are now more than 100 000 mHealth apps available (research2guidance, 2014). With so much expansion, and more growth ahead, both customers and healthcare professionals are left with a bewildering choice.

The use of apps by people with diabetes

A 2014 European Green Paper on mHealth highlighted that mHealth solutions could contribute to a more patient-focused healthcare approach and support a shift towards prevention while at the same time

improving the efficiency of the healthcare system (European Commission, 2014). In the context of diabetes, this could be through early prevention by use of self-assessment tools and also through remote diagnoses and monitoring. Solutions for interacting with patients remotely offer potential cost savings and greater efficiency at a time when the number of people with diabetes is rapidly increasing.

In 2014, Patient View conducted a global survey to ask patients and carers what they wanted from healthcare apps. In all, 1130 people responded to the survey from 31 different countries (82% from Europe). The top responses included:

- Understanding their condition and treatment choices.
- Providing support, such as care planning
- Tracking and monitoring symptoms.
- Providing a way to communicate with their healthcare professional.

The main barriers were confusion over which app to choose, preference for a face-to-face interaction with a healthcare professional and lack of trust in an app (Patient View, 2015).

Searching on any app store for diabetes apps yields hundreds of different choices. What is difficult to ascertain is whether the app is safe and has a peer-reviewed evidence base and whether it offers any benefit for patient care. This presents a challenge for healthcare professionals when deciding which ones to recommend or download. Healthcare professionals normally give advice based on

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evidence. Apps, however, are unregulated and, therefore, good-quality trials into efficacy are rare.

Research that has been conducted into diabetes apps mainly concentrates on usability and the quality of the information that is made available, rather than specific health outcomes. One study (Rao et al, 2010), which looked at three diabetes apps, evaluated self-reported ease of use but did not look at any clinical outcomes. Users were asked to perform certain tasks on each of the apps, such as entering a range of blood glucose measurements on certain days and times and adding a note to a meal. The research highlighted limitations in the apps, such as requiring manual entry of blood glucose results and a lack of features to help calculate insulin doses based on carbohydrate intake.

A systematic review by El-Gayer (2013) looked at journal articles related to commercially available apps for type 1 and type 2 diabetes. It questioned whether there was evidence to show that these apps had helped people with self-management: 71 apps and 16 articles were included in the review. The review concluded that app usage resulted in improvements in healthy eating, frequency of blood glucose testing and physical activity. However, limitations in the apps included a lack of personalised feedback and having to manually enter blood glucose data.

App developers are starting to take note of these findings, and some are using focus groups and surveys to ensure that new diabetes apps have the right components to ensure continuous use. A poster presented at the *Advanced Technologies and Treatments for Diabetes* conference in Paris (Rose et al, 2013) evaluated the MySugr app, which is available in Europe and the United States. The research showed a 10–20% increase per user in the number of blood glucose tests performed per day. There was also a reduction in HbA_{1c} ranging from 4.4–15.3 mmol/mol (0.4–1.4%; $n=8$). The app was easy to use, features gamification and was built on feedback from more than 600 people with diabetes. Health outcome data were limited to a small number

of users who took part in a pilot project, and a larger study is required to prove long-term improvements in HbA_{1c}.

How to review new apps

A White Paper from Patient View identified critical success factors for a diabetes app (linked to in Patient View [2015]). These included:

- Drawing on the skills available in the field of diabetes such as those of endocrinologists, diabetes specialist dietitians and specialist nurses.
- Co-creating materials with patients and healthcare professionals.
- Having predictive and personalised support built into the app.

Regulation of the app was also another key factor. Indeed, the British Standards Institution (2015) recently published a code of practice for health and wellness apps. While this is currently only a guidance document for app developers, it is a great stride towards providing key recommendations for developing health and wellbeing apps. In turn, this should allow healthcare professionals to be able to make recommendations for apps that meet the standards laid out, thus giving greater trust in the developer and the content of an app. It is likely to take time for this information to filter to app developers and healthcare providers, so in the interim one needs to look to other sources of information that can help to indicate whether an app is safe and useful. Unbiased, peer-reviewed articles are one source of information. Articles in Diabetes UK's *Balance* (Diabetes UK, 2012; <http://bit.ly/1N2eMz5>) and the British Dietetic Association's monthly magazine *Dietetics Today* in 2013 are just two examples. These articles give a brief review of available apps for diabetes and offer an unbiased review.

Other tips for assessing an app are provided in *Box 1*.

Conclusion

It is clear that there is an urgent need for more high-quality research into health apps and

Box 1. Tips for the review of apps.

- Download a range of apps for your own smartphone and test them out. Try search terms such as “diabetes”, “blood glucose”, “diabetes log book” and “carbohydrate counting”. Look at the charts on the app stores to see the best-selling apps for health.
- Check where the app is from. Apps made in other countries may not use the right units and their food databases may include different values or recommendations to the UK.
- Look at feedback on the app store. What do other users of the app say about the usability and usefulness of the app? Check the number of reviews and the star rating.
- Ask patients what apps they use, which ones they like and why? Many will already be using apps, so ask them what they find useful and, importantly, which ones they continue to use on a daily basis. If an app has only been used once or twice and then forgotten, there is probably a good reason.
- Who has made the app? Look at the developer’s website to see if you can ascertain whether any healthcare professionals have been involved and whether the app is using evidence-based information.
- Does the app present any clinical risk to your patient? For example, dose recommendations of insulin may be incorrect or not take into account insulin action time. Apps that recommend doses of insulin begin to cross the line into becoming a medical device and the current regulation of apps has not yet caught up to tighten the loophole in this area.
- What is the main purpose of recommending the app? Is it fit for purpose? Some apps can try to do too much and overcomplicate the process making them less user-friendly.
- Is the app available on the device the person has? Most apps will normally be available on iOS and Android platforms, but other platforms, such as Windows, are not far behind. Developers have to spend considerable money to develop an app on each system as they all use different programming language.
- Think about cost. Many apps are free but then they often only have limited purpose and contain advertising. An app that costs money should not be looked on as a bad thing as it is rare for any to cost more than £5. App development is expensive; so do not be discouraged if it costs a few pounds.

their ability to improve health outcomes. The growth in smartphone use and development of new and more complex apps is unlikely to slow anytime soon. Healthcare professionals who recommend an app should investigate it and be able to know its benefits for their patient group.

Confidence that the information that it contains is accurate, and that it is not going to cause any harm or give any misleading advice, should be a major factor. As time goes on, mHealth app developers in the UK will hopefully start to adapt the new guidelines from the British Standards Institution, thus making it easier for healthcare professionals to recommend certain apps.

Technology has the potential to offer great benefits to the management of diabetes but, until we have clear evidence about particular apps, good clinical judgement and communication with colleagues and patients seem to be the best way forward. ■

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