

Use of digital tracking devices in the management of diabetes mellitus – a systemic review and meta-analysis

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BACKGROUND

- Self-monitoring techniques, including glucose-levels, food intake, and physical activity have been shown to be beneficial and essential in diabetes management.
- The development of digital devices as PDAs, smartphones and tablets has opened up new areas for self-tracking of biometric data.
- Mobile phones and wireless Internet technology are advancing rapidly and available at low costs. Their ubiquitous availability, their computing capabilities and the development of ever new health-tracking applications and hardware add-ons changed healthcare possibilities¹.

OBJECTIVE

To assess the effectiveness of a digital tracking devices (DTDs) (e.g. web-based, mobile phone) for the reduction of HbA1c, and furthermore, to compare the safety of the digital approach to conventional (i.e. paper-based) methods.

METHODS

- A systemic literature search was conducted in October 2014, covering publications between Jan 1st, 1990 and Oct 16th, 2014 (databases PubMed and Embase).
- The primary aim was to identify randomized, controlled clinical trials investigating the effect of a DTD in diabetes mellitus type 1 (DM1) and type 2 (DM2), including adults, adolescents and the special population of pregnant women (GDM) compared to a conventional, usual-care approach.
- Included trials were evaluated regarding outcome of clinical parameters, quality of life (QoL) and socio-economical parameters.
- A meta-analysis was performed on pooled HbA1c change from baseline reported in the identified trials.

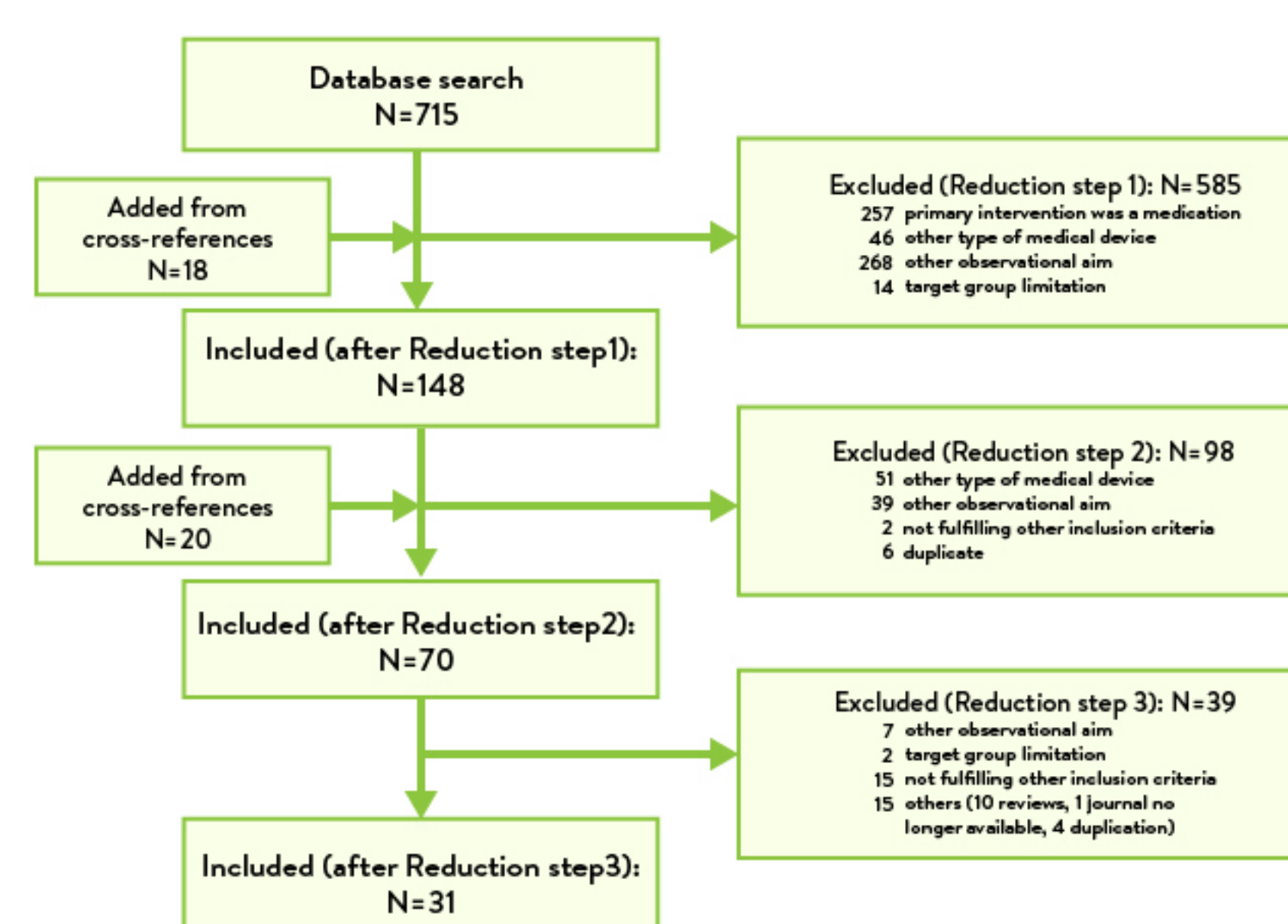


Figure 1. Systemic Review Flow Diagram

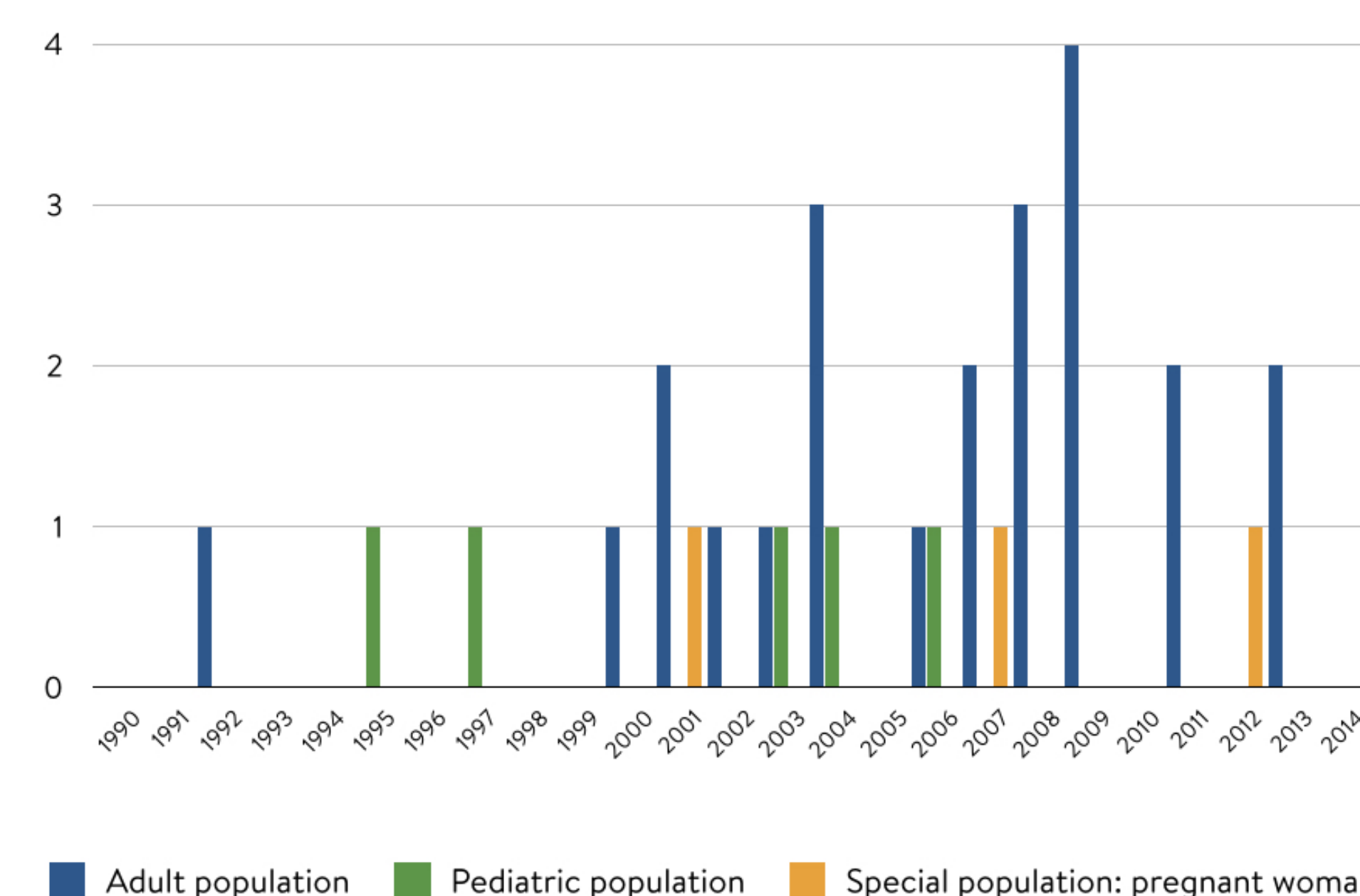


Figure 2. Number of Publications identified per Publication Year and Population

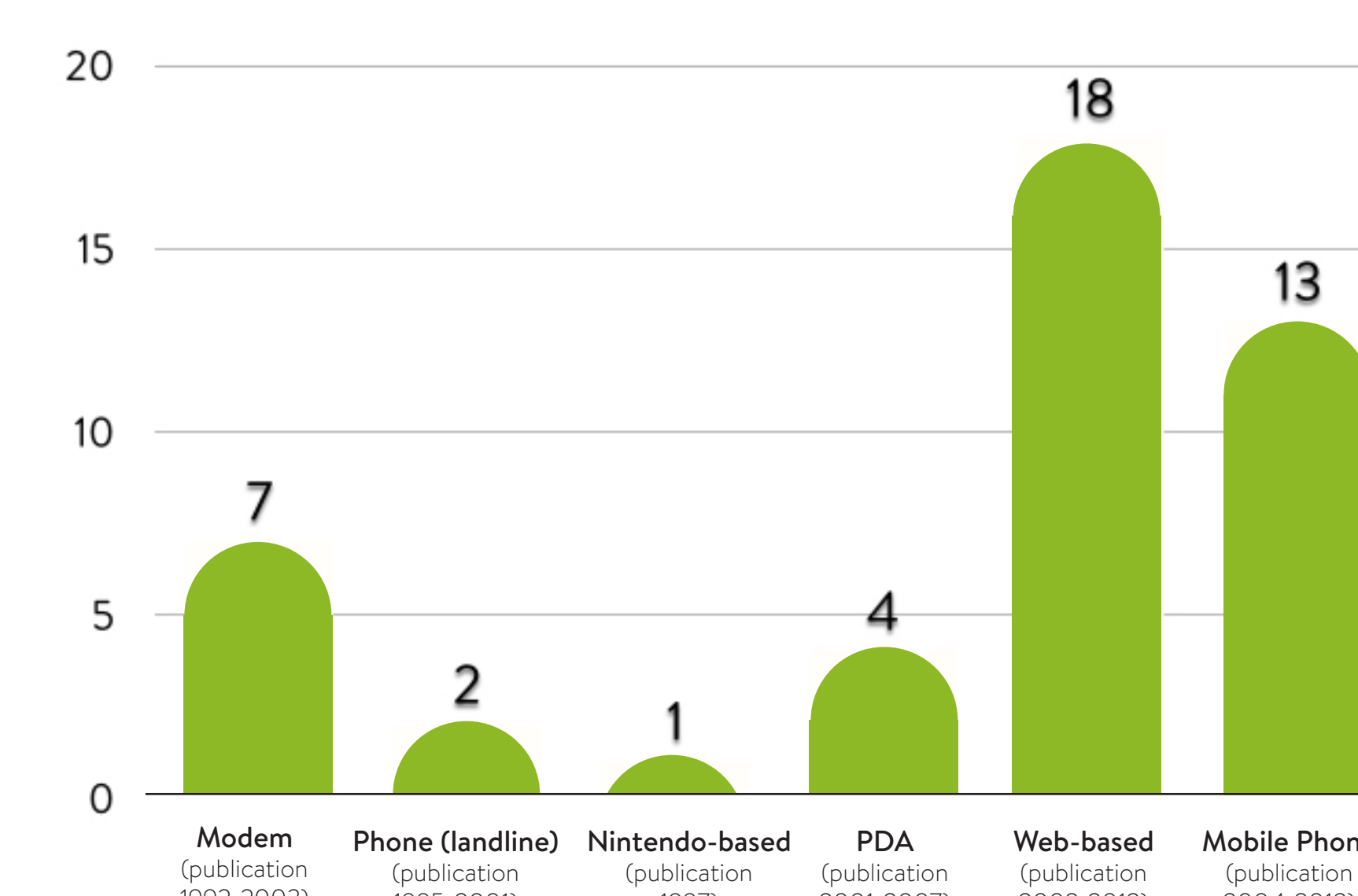


Figure 3. Types of Technology included in the Systemic Review (reflecting the fast development of DTDs in DM management within the last 20 years)

RESULTS

In this review, a total of 31 studies²⁻³² fulfilled the search criteria and were included in the final evaluation, comprising overall 3,502 subjects and a total of 1,943 using any DTD in DM management in short- and long-term.

Twenty-nine (29) trials were randomized clinical trials; 93.5% parallel/controlled trials and a low number of cross-over studies (12.9%); further 1 observational study and 1 study that did not give any detail on randomization status nor study type.

Twelve (12) studies assessed DM1, 11 DM2, 5 included both indications (DM1/DM2), and additional 3 trials evaluated GDM. Most of the trials (93.5%) compared digital tracking devices with controls (conventional/usual care without digital tracking/telemedicine). Twenty-four (24) studies (77.4%) used a telecare approach and 2 of the included studies (6.5%) used gamification.

Meta-analysis of 19 trials in the adult population found a -0.38 % difference [95%CI -0.40 to -0.37] in HbA1c between usage of digital tracking devices and controls.

DISCUSSION

- The majority of studies has shown that usage of digital tracking devices is effective, safe and well accepted in adults, adolescents and elderly diabetic patients, as well as in the special population of pregnant women with GDM.
- Digital self-tracking improved glycaemic control as measured by HbA1c and had also positive effects on the lipid profile, blood pressure, quality of life including self-efficacy, adherence behaviour and cost of care.
- Some of the studies failed to show significant differences between users of digital tracking devices and controls, but it has to be noted that none of the evaluated studies found that the usage of digital tracking devices was inferior to the conservative approach.

CONCLUSION

Therefore, we conclude that the use of digital tracking devices in diabetes management is effective, safe and well accepted for different patient populations.

CONTACT

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