Home telehealth for diabetes management: a systematic review and meta-analysis
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CRD summary
The review concluded that home telehealth had a positive effect on glycaemic control and healthcare resource use, but further research is needed. The review was generally well conducted, but limited evidence and mixed outcomes for some health resource use outcomes should be taken into account when interpreting the review findings.

Authors' objectives
To assess the potential benefits of home telehealth compared with usual care for patients with diabetes.

Searching
MEDLINE, EMBASE, BIOSIS Previews, CINAHL, PsycINFO, The Cochrane Library and the CRD databases were searched from 1998 to 2008 for articles published in any language. Search terms were reported. Internet searches of health technology assessment agencies' websites were conducted.

Study selection
Randomised controlled trials (RCTs) and observational studies of home telehealth compared with usual care in patients with diabetes were eligible for inclusion. Home telehealth included both home telemonitoring and telephone support; definitions were reported in the review. Relevant outcomes were glycaemic control, health care resource use and quality of life.

The included studies examined home telemonitoring versus usual care and telephone support versus usual care in patients with diabetes (type I and type II). Mean age of participants ranged from 13 to 72 years. Mean duration of disease ranged from less than one year to 19.2 years.

Two reviewers independently performed study selection. Disagreements were resolved by consensus.

Assessment of study quality
Studies were assessed according to criteria devised by Hailey et al. for assessment of study design, patient selection, description of comparators and outcomes reported. Study quality was rated on a scale from A (high quality and high confidence in findings) to E (poor quality and unacceptable confidence in findings).

Quality assessment was undertaken by two reviewers.

Data extraction
Two reviewers independently extracted data on glycaemic control, health care resource use and quality of life and where possible used the data to calculate weighted mean differences (WMDs) or risk ratios, together with 95% confidence intervals (CIs). Disagreements were resolved by consensus.

Methods of synthesis
Studies with a prospective cohort design or RCT design and a quality score of at least C were combined in a random-effects meta-analysis. Statistical heterogeneity was assessed using the $I^2$ test and if present was explored qualitatively. Studies were also narratively synthesised and grouped according to outcomes and type of telehealth.

Results of the review
Twenty-six studies were included in the review (n=5,069): 20 studies of home telemonitoring versus usual care and six studies of telephone support versus usual care. Study sample size ranged from 19 to 1,665 participants. Follow-up ranged from three months to three years. Validity assessment indicated that the quality of the home telemonitoring studies was variable: 13 studies were rated as C or above (moderate to high quality) and seven studies were rated as D or E (fair to poor quality). Telephone support studies were all rated C or above (moderate to high quality).
Glycaemic control: Compared with usual care, home telemonitoring patients had improved glycaemic control as measured by HbA1c (WMD -0.22, 95% CI -0.35 to -0.08, I²=16%; 12 RCTs). When telephone support was compared with usual care, the effects on glycaemic control were variable; two studies found positive effects and two studies found negative effects.

Health resource use: Health telemonitoring was associated with a reduction in the number of hospitalised patients (two studies), a reduction in hospitalisations (one study) and a reduction in bed days of care (three studies). Limited data were available for telephone support.

Home telemonitoring was also associated with: mixed effects on the number of patients visiting emergency departments (one positive and one negative study); an increase in the number of patients who visited primary care (two studies), but a reduction in the number of primary care visits (one study); an increase in the number of patients who visited specialist clinics (one study); and an increase in the number of office visits (one study).

Quality of life: Four of 11 studies reported no difference between groups in satisfaction of health-related quality of life. The other studies reported positive outcomes on at least one measure.

Authors' conclusions
Home telehealth had a positive effect on glycaemic control and healthcare resource use. Further research was needed.

CRD commentary
Inclusion criteria for the review were clearly defined. Several relevant databases were searched without language restrictions. Publication bias was not assessed and could not be ruled out. The authors attempted to minimise reviewer error and bias throughout the review by undertaking study selection, data extraction and quality assessment in duplicate. Quality assessment was based on specified criteria. Only aggregate quality scores were reported and these indicated variable study quality. Trials were combined using random-effects meta-analysis where possible. Statistical heterogeneity was assessed and accounted for. A narrative synthesis was presented where meta-analysis was not suitable, which was appropriate.

Overall, the review was well conducted, but the limited evidence and mixed outcomes for some health resource use outcomes should be taken into account when interpreting the review findings.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that more studies of higher methodological quality were needed. Studies should ideally include a more diverse patient population to increase external validity. A common approach to home telehealth initiatives should be developed to increase study quality and comparability.

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