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## Healthcare via cell phones: a systematic review

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### CRD summary

This review concluded that standard care with reminders, disease monitoring and management, and education through cell phone voice and short message service can help improve health outcomes and care processes. Due to the possibility of bias and error in the review process and the unknown quality of included studies these conclusions may not be reliable.

### Authors' objectives

To investigate the role of cell phones and text messaging interventions in improving health outcomes and processes of care.

### Searching

MEDLINE was searched (1950 to May 2008). Search terms reported. Reference lists were searched. Studies of any language were eligible for inclusion, provided they included a complete English abstract.

### Study selection

Randomised controlled trials (RCTs) or controlled studies that evaluated delivery of health information or educational intervention that used cell phone or text messaging and measured change in the process of care and/or health outcomes were eligible for inclusion. Studies that used wired internet or wireless communications to provide information using email or the web were included.

The duration of the included studies was two days to 12 months (mean duration six months). Delivery frequency varied. A number of clinical areas were included (such as diabetes, smoking cessation, HIV/AIDS, general outpatients). Various outcome measures were reported. Studies were conducted in European countries, Australia, New Zealand, USA and Korea. Technologies used were short message service (SMS), personal digital assistant, voice, email and internet. Control groups varied, but usually involved standard care.

The authors stated neither how the papers were selected for the review nor how many reviewers performed the selection.

### Assessment of study quality

The authors did not state that they assessed validity.

### Data extraction

The authors did not state how data were extracted.

### Methods of synthesis

Studies were combined in a narrative synthesis grouped by the following outcomes: behaviour change; clinical improvement; and social functioning. Processes of care were grouped. A table of study details was available for examination of between-study differences.

### Results of the review

Twenty-five studies were included in the review (n=35,376): 20 RCTs and five controlled trials.

Processes of care: Text messaging was associated with fewer days to diagnosis (one study) and improved communication in participants with disabilities (one study). Failure-to-attend rates were significantly improved in two studies, but did not differ significantly between intervention and control groups in two other studies.

Outcomes of care (behaviour change): Studies of smoking cessation reported that voice or SMS educational intervention groups were associated with significantly greater success in behaviour modification than control groups

(four studies). Two studies reported a significantly greater increase in compliance with medication in the SMS groups compared with control. One study reported a significant improvement in insulin adherence in the group that received test messages ( $p < 0.05$  reported).

**Outcomes of care (clinical improvement):** Eight of nine studies reported significant improvements in diabetes-related health outcomes with diabetes control and management information and education messages delivered via cell phone. Seven studies found diabetes education and advice via cell phone and text messaging resulted in significant reductions in HbA1c. One study reported significantly greater improvement in asthma patients (night time symptoms and asthma cough as well as drug treatment) in the text message group compared with control. One study that assessed the effect of text messages on relaxation reported a significant decrease in anxiety score in the intervention group compared with control. One study of mobile phone advice/motivational tips for physical activity reported a significant improvement in body fat lost, but not in body mass index, diastolic blood pressure or systolic blood pressure compared with control. There was no significant difference between intervention and control groups in a study of blood pressure monitoring regarding percentage of patients with controlled blood pressure or rate of compliance with blood pressure control advice.

**Outcomes of care (social functioning):** One study reported a significant improvement in quality of life and satisfaction with life. Two other studies reported significant improvement in self-efficacy.

### **Authors' conclusions**

Standard care with reminders, disease monitoring and management, and education through cell phone voice and short message service can help improve health outcomes and care processes.

### **CRD commentary**

The research question was supported by inclusion criteria for study design, intervention and outcomes. The authors did not report searches of unpublished data and only studies published in English or with English-language abstracts were eligible for inclusion, so publication and language bias could not be ruled out. The authors did not report the review process, so it was not known whether steps were taken to reduce possible error and bias (such as performing processes in duplicate). Study quality was not assessed, so it was unknown whether the results of the included studies were reliable. Many studies had small sample sizes. Narrative synthesis was appropriate given the diversity of the included studies. Due to the possibility of bias and error in the review process and the unknown quality of included studies, the authors' conclusions may not be reliable.

### **Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that more controlled studies with larger sample sizes needed to be conducted in order to gain a better understanding of cell phone interventions in improving health outcomes and processes of health care. Studies were also needed on the cost-effectiveness and technical and financial feasibility of adoption in real clinical settings.

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