Community Preventive Services Task Force

# Health Information Technology: Text Messaging Interventions for Medication Adherence Among Patients with Chronic Diseases

## Community Preventive Services Task Force
## Finding and Rationale Statement
## Ratified August 2017

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# CPSTF Finding and Rationale Statement

## Intervention Definition

Text messaging interventions for medication adherence send messages to patients who have at least one chronic medical condition to remind or encourage them to take their medications as prescribed.

- Messages must be accessible through patients' mobile telephones.
- Messages must be sent regularly, though frequency may vary from medication dose times to weekly adherence reminders.
- Messages may be personalized to patients.
- Interventions may involve two-way communication with a healthcare provider.

## Community Preventive Services Task Force Finding (August 2017)

The Community Preventive Services Task Force (CPSTF) recommends the use of text messaging interventions for patients with chronic medical conditions based on sufficient evidence of effectiveness in increasing medication adherence. Evidence was considered sufficient based on studies that found meaningful improvements in short-term rates of medication adherence across a range of different chronic medical conditions.

## Rationale

### Basis of Finding

The Community Preventive Services Task Force (CPSTF) uses recently published systematic reviews to conduct accelerated assessments of interventions that could provide program planners and decision-makers with additional, effective options. The following published review was selected and evaluated by a team of specialists in systematic review methods, and in research, practice, and policy related to chronic disease prevention.

> Thakkar J, Kurup R, Laba TL, Santo K, Thiagalingam A, et al. Mobile telephone text messaging for medication adherence in chronic disease. *JAMA Internal Medicine* 2016;176(3):340-9.

The team examined each of the studies included in the systematic review and abstracted supplemental information about study, intervention, and population characteristics.

The CPSTF finding is based on results from the published review, additional information from the included studies, and expert input from team members and the CPSTF.

The published systematic review identified 16 randomized controlled trials (search period through January 2015). Included trials examined the effectiveness of text messaging interventions in improving patients' medication adherence. The review considered trials of text messaging interventions that were implemented alone, without additional patient or clinical system interventions. Included studies evaluated interventions with patients who had a variety of chronic medical conditions in both developed and developing countries. Results of the meta-analysis are summarized in Table 1 below.

**Table 1: Medication Adherence Outcomes**

| Outcome | Number of included Studies | Summary results (meta-analysis) |
|---|---|---|
| Patient or Medication Dose Adherence (study defined) | 16 RCTs | Odds ratio = 2.11 (95%CI 1.52 to 2.93) |

The CPSTF conclusion also considered evidence from the subset of included trials conducted in high-income countries (7 studies). The CPSTF finding of sufficient evidence was based on the magnitude of effect estimates, number of studies, and consistency of effects for this subset, summarized in Table 2 below.

**Table 2: Findings from Subset of Studies in High-Income Countries**

| Outcome: | Number of included Studies | Summary results (Median absolute percent difference) |
|---|---|---|
| Patient or Medication Dose Adherence (study defined) | 7 RCTs | Increase of 13.8 percentage points (Interquartile interval: 8.9 to 17.8 percentage points) |

Studies included in the Thakkar et al. review provided text messages daily (8 studies), weekly (3 studies), or on a dose-timed frequency (4 studies). Interventions were of short duration (median 14 weeks; interquartile interval [IQI]: 6.5 to 24 weeks). Ten studies sent automated text messages. Eight studies employed two-way communication with healthcare providers. Five studies sent patients personalized messages.

Thakkar et al. conducted stratified analyses to evaluate for differences in effectiveness based on intervention characteristics including message frequency, intervention duration, personalized message content, and two-way communication. Conclusions were limited by the small number of studies for each characteristic and non-significant results.

## Applicability and Generalizability Issues

The CPSTF assessment on applicability focused on the subset of seven trials from high-income countries. Only two of the studies in this subset were conducted in the United States. The remaining studies were conducted in Denmark, England, France, The Netherlands, and Spain (1 study each). Patients were recruited from hospitals or clinics (5 studies), pharmacies (1 study), and communities (1 study). Studies evaluated interventions with patients who were taking medications for hypertension (1 study), heart disease (3 studies), diabetes (1 study), HIV (1 study), and asthma (1 study). Reporting of participant demographic characteristics was poor. Although evidence for specific settings and patient characteristics is limited or absent, the intervention is simple and focused on improving a basic patient self-management behavior. Therefore, the CPSTF finding should be applicable to U.S. adults who are taking medications for a chronic condition.

## Data Quality Issues

The published systematic review included only randomized controlled trials. Study quality was evaluated using the Cochrane risk of bias assessment tool (Higgins et al. 2011). Common limitations in the overall body of evidence included failure to conduct intention to treat analyses (8 studies), and incomplete reporting of outcome data (5 studies). The median loss to follow-up was 14.5% (IQI: 6% to 21%; 16 studies). Medication adherence was based on self-recall (9

studies), pill counts (3 studies), and medication event monitoring systems (4 studies). Studies categorized adherence based on thresholds that ranged from 80% (2 studies) to 95% (7 studies).

### Other Benefits and Harms

The review by Thakkar et al. did not report information regarding additional benefits or potential harms of these interventions. Use of text messages to encourage or remind patients to take their medications might reduce the number of outpatient visits needed to determine optimal medical management. Text messages may be a source of distraction for patients engaged in other activities. The CPSTF did not postulate any additional harms of these interventions.

### Considerations for Implementation

The review by Thakkar et al. did not summarize information on intervention implementation. The included studies provided few details on implementation and most were conducted prior to the availability of smart-phones. The rapid evolution of mobile device technology is likely to provide newer studies with opportunities for substantially enhanced or personalized message content and interactivity.

The Million Hearts Initiative® provides action guides [millionhearts.hhs.gov/tools-protocols/medication-adherence.html] that detail organizational considerations and options to address medication adherence for cardiovascular disease prevention.

CDC also provides a medication adherence toolkit [effectiveinterventions.cdc.gov/en/HighImpactPrevention/BiomedicalInterventions/MedicationAdherence.aspx] for providers and a mobile application for use by patients with HIV.

Implementers should understand state policies regarding application of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) to electronic communications involving patients.

### Evidence Gaps

The systematic review by *Thakkar et al.* identified several areas for future research. These included the need for longer duration evaluations based on objective measures of medication adherence and inclusion of clinical outcomes. Additional studies could also examine the benefits of different features of text message interventions.

The CPSTF identified the following areas for additional research:

- Are text messaging interventions effective when implemented and evaluated over longer periods of time (1-2 years)?
- Are these interventions also effective in improving clinical outcomes and health care use, and in reducing morbidity and mortality?
- How does intervention effectiveness vary when
    - Recruitment of clients occurs in workplaces or community settings?
    - Implemented for patients who vary by race, ethnicity, or SES?
    - Implemented for patients at the initiation of medical management?
    - Implemented for patients with previously low adherence?
    - Based on new or existing mobile-phone applications?
    - Combined with additional interventions to improve patient self-management and clinical care?

- Are text messaging interventions effective when implemented and evaluated with larger samples of U.S. patients living with HIV?

## References

Thakkar J, Kurup R, Laba TL, Santo K, Thiagalingam A, et al.. Mobile telephone text messaging for medication adherence in chronic disease. *JAMA Internal Medicine* 2016;176(3):340-9.

Higgins JP, Green S (editors). Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0. Updated March 2011: The Cochrane Collaboration, 2011. Available from URL: http://handbook-5-1.cochrane.org/.

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## Disclaimer



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