

Date: March 29, 2012

Title: Electronic Reminders to Address Adherence

Clinical Question: Among pediatric patients and families, does the use of electronic reminders such as text messaging versus standard care (no electronic reminders) improve adherence to taking medication and attending outpatient appointments?

Target Population: Pediatric patients and their parents/guardians/caregivers

Recommendations: (See Table of Recommendation Strength)

1. It is strongly recommended that electronic reminders such as text messaging be used to reduce no-show rates in the outpatient clinic (Guy et al, 2011 [1a]; Chen, Fang, Chen, & Dai, 2008 [2a]; Leong et al., 2006 [2b]; Koshy, Car, & Majeed, 2008 [4a]; Foley & O'Neill, 2009 [4a], Geraghty, Glynn, Amin, & Kinsella, 2008 [4a]; Ting et al., 2012 [2a]; Wei, Hollin, & Kachnowski, 2011 [5a]).
2. It is strongly recommended that electronic reminders such as text messaging be used with patients and families to positively impact behavior change and improve medication adherence (Cole-Lewis & Kershaw, 2010 [1a]; Boren, & Balas, 2009 [1b]; Strandbygaard, Thomsen, & Backer, 2010 [2a]; Wei et al., 2011 [5a]).

Note: To maintain confidentiality, do not share protected health information in text messaging (Leong et al., 2006 [2b]).

Discussion/Summary of Evidence Related to the Recommendations:

Adherence to the treatment regimen and outpatient appointments can be linked to health outcomes, such as possible improvement in quality of life, possible reduction in risk of hospitalization, and allowing for changes in medication or clarifying confusion about the treatment regimen (Guy, Hocking, Wand, Stott, Ali, & Kaldor, 2011 [1a]).

Compared to no appointment reminder, text message reminders increase the likelihood that patients will attend clinic appointments by 50 percent in both primary care and hospital outpatient clinics (Guy et al., 2011 [1a]). For this systematic review there was no meta-analysis performed due to significant heterogeneity among the studies.

Text messaging has been shown to be at least as effective as calls at reducing outpatient appointment nonattendance and is more cost effective (Chen, Fang, Chen, & Dai, 2008 [2a]; Leong et al., 2006 [2b]; Koshy, Car, & Majeed, 2008 [4a]; Foley & O'Neill, 2009 [4a]; Geraghty, Glynn, Amin, & Kinsella, 2008 [4a]; Ting et al., 2012 [2a]; Wei, Hollin, & Kachnowski, 2010 [5a]). Text messaging has the potential to reach a large number of patients and families at relatively low cost and has been shown to be effective at improving attendance rates (Chen et al., 2008 [2a]). Information interventions through electronic media such as text messages have been shown to positively impact behavior change including smoking cessation, weight loss, and daily vitamin consumption (Cole-Lewis & Kershaw, 2010 [1a]; Krishna, Boren, & Balas, 2009 [1b]) and improved mean adherence to medication by 17.8%, 95% CI (3.2-32.3%), $p=0.019$ (Strandbygaard, Thomsen, & Backer, 2010 [2a]). Chronic diseases requiring regular management, such as diabetes and asthma, benefit most from cell phone-based interventions (Krishna et al., 2009 [1b]). All of the systematic reviews (Guy et al., 2011 [1a]; Cole-Lewis & Kershaw, 2010 [1a]; Krishna et al., 2009 [1b]) and the literature review Wei, et al., 2011 [5a] included studies with pediatric populations. Many of the individual articles that were appraised were specific to the pediatric population (Ting et al., 2012 [2a]; Nelson, Foley & O'Neill, 2009 [4a]; Geraghty et al., 2008 [4a]) and those studies looking at adult patients could be generalized to the pediatric population since in most cases the text messages for pediatric patients are sent to the adult caregiver. The use of text messaging could potentially help reduce disparities in access as the ownership of cell phones is more prevalent among those with low socioeconomic status (Krishna et al., 2009 [1b]).

Dimensions for Judging the Strength of the Recommendation:

Reflecting on your answers to the dimensions below and given that more answers to the left of the scales indicates support for a stronger recommendation, complete one of the sentences above to judge the strength of this recommendation.

(Note that for negative recommendations, the left/right logic may be reversed for one or more dimensions.)

1. Grade of the Body of Evidence	<input checked="" type="checkbox"/> High	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low
Comments: For each outcome (appointment attendance and behavior change/adherence) there was a high level of evidence.			
2. Safety / Harm (Side Effects and Risks)	<input checked="" type="checkbox"/> Minimal	<input type="checkbox"/> Moderate	<input type="checkbox"/> Serious
Comments: Incorrect data entry could result in the patient/family not receiving the text message (Koshy et al., 2008 [4a]). There is a chance that the text message may not be received by the patient/family if the cell phone is lost – in that case, the text would most likely show that it went through so the sender would not be aware that the information was not received (Cole-Lewis & Kershaw, 2010 [1a]). There could also be a risk to confidentiality; the evidence suggested that the reminders not include protected health information such as clinical information or laboratory results (Leong et al., 2006 [2b]).			
3. Health benefit to patient	<input type="checkbox"/> Significant	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> Minimal
Comments: Patients who fail to attend outpatient appointments and who have had insufficient adherence to medications have experienced more adverse health outcomes, such as increased hospitalization rates as well as poor symptom management (Guy et al., 2011 [1a]; Strandbygaard et al., 2010 [2a]).			
4. Burden on patient to adhere to recommendation	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Unable to determine	<input type="checkbox"/> High
Comments: The evidence suggests that health care providers are encouraged to be proactive in soliciting information from patients/caregivers about any change in mobile phone contact information (Chen et al., 2008 [2a]). While the perception of text message reminders is overall positive, it is suggested that the timing of the text message be individualized to each patient to optimize the effect (Strandbygaard et al., 2010 [2a]).			
5. Cost-effectiveness to healthcare system	<input checked="" type="checkbox"/> Cost-effective	<input type="checkbox"/> Inconclusive	<input type="checkbox"/> Not cost-effective
Comments: Several articles stated that text messaging is more cost effective than phone calls, and that improving clinic attendance increases revenue (Chen et al., 2008 [2a]; Leong et al., 2006 [2b]; Koshy et al., 2008 [4a]; Foley & O'Neill, 2009 [4a]; Geraghty et al., 2008 [4a]; Ting et al., 2012 [2a]; Wei et al., 2011 [5a]).			
6. Directness of the evidence for this target population	<input checked="" type="checkbox"/> Directly relates	<input type="checkbox"/> Some concern of directness	<input type="checkbox"/> Indirectly relates
Comments: The evidence looked at various populations, including healthy patients in the primary care setting as well as pediatric patients with chronic illness in specialty clinics (Ting et al., 2012 [2a]; Cole-Lewis & Kershaw, 2010 [1a]; Krishna et al., 2009 [1b]; Strandbygaard et al., 2010 [2a]). It has been found that text messages can reduce nonattendance rates in a wide variety of settings (Guy et al., 2011 [1a]).			
7. Impact on morbidity/mortality or quality of life	<input type="checkbox"/> High	<input checked="" type="checkbox"/> Medium	<input type="checkbox"/> Low
Comments: It is assumed that increasing treatment adherence and outpatient appointment compliance will improve symptom management.			

Reference List: (Evidence Level in []); See Table of Evidence Levels following references)

Chen, Z., Fang, L., Chen, L., & Dai, H. (2008). Comparison of an SMS text messaging and phone reminder to improve attendance at a health promotion center: A randomized controlled trial. *Journal of Zhejiang University SCIENCE B*, 9(1), 34-38. [2a]

Cole-Lewis, H. & Kershaw, T (2010). Text messaging as a tool for behavior change in disease prevention and management. *Epidemiologic Reviews*, 32, 56-69. [1a]

Division of Pulmonary Medicine, Cincinnati Children's Hospital Medical Center, outpatient appointment data, January, 2009 - July, 2011 [5].

Foley, J. & O'Neill, M. (2009). Use of mobile telephone short message service (SMS) as a reminder: The effect on patient attendance. *European Archives of Paediatric Dentistry*, 10 (1), 15-18. [4a]

Geraghty, M., Glynn, F., Amin, M., & Kinsella, J. (2008). Patient mobile telephone 'text' reminder: A novel way to reduce non-attendance at the ENT outpatient clinic. *The Journal of Laryngology & Otology*, 122, 296-298. [4a]

- Guy, R., Hocking, J., Wand, H., Stott, S., Ali, H. and Kaldor, J. (2011). How Effective Are Short Message Service Reminders at Increasing Clinic Attendance? A Meta-Analysis and Systematic Review. *Health Services Research*. doi: 10.1111/j.1475-6773.2011.01342.x [1a]
- Koshy, E., Car, J., & Majeed, A. (2008). Effectiveness of mobile-phone short message service (SMS) reminders for ophthalmology outpatient appointments: An observational study. *BMC Ophthalmology*, 8 (9), 1-6. [4a]
- Krishna, S., Boren, S., & Balas, E. (2009). Healthcare via cell phones: A systematic review. *Telemedicine and e-Health*, 15 (3), 231-240. [1b]
- Leong, K.C., Chen, W., Leong, K.W., Mastura, I., Mimi, O., Sheikh, M., Zailinawati, A., Ng, C., Phua, K., & Teng, C. (2006). The use of text messaging to improve attendance in primary care: A randomized controlled trial. *Family Practice Advance Access* 699-705. [2b]
- Nelson, T.M., Berg, J.H., Bell, J.F., Leggott, P.J., & Seminario, A.L. (2011). Assessing the effectiveness of text messages as appointment reminders in a pediatric dental setting. *Journal of the American Dental Association*, 142(4): 397-405. [2b]
- Strandbygaard, U., Thomsen, S. F., & Backer, V. (2010). A daily SMS reminder increases adherence to asthma treatment: A three-month follow-up study. *Respiratory Medicine*, 104(2), 166-171. [2a]
- Ting, T.V., Kudalkar, D., Nelson, S., Cortina, S., Pendi, J., Budhani, S., Neville, J. Taylor, J., Huggnis, J., Drotor, D., & Brunner, H. (2012). *The Journal of Rheumatology*, 39 (1). [2a]
- Wei, J., Hollin, I., & Kachnowski, S. (2011). A review of the use of mobile phone text messaging in clinical and healthy behavior interventions. *Journal of Telemedicine and Telecare*, 17, 41-48. [5a]

SUPPORTING INFORMATION

Background/Purpose of BES_t Development:

From a systems perspective, nonattendance at clinic visits reduces the efficiency of health systems (Chen et al., 2008 [2a]). Patient nonattendance in the outpatient clinic can have many negative impacts such as wasted resources, less productivity of staff, and less opportunity for learning for staff and students (Geraghty et al., 2008 [4a]). Data on no show rates by month for health care providers in Pulmonary for January, 2009 - July, 2011 range from 0% to 42.9% (data collected by the Division of Pulmonary Medicine at Cincinnati Children's Hospital Medical Center).

Reasons for clinic nonattendance have been well documented, including forgetfulness and confusion about appointment dates and times (Nelson, 2011 [2b]).

The prevalence of cell phone ownership and use has increased over time; almost every household in the United States has at least one cell phone (Krishna et al., 2009 [1b]) and the use of cell phones has grown in groups at risk of having lower rates of appointment attendance (Nelson, 2011 [2b]). Wireless mobile technology may help remove disparities as the ownership and use of cell phones is more prevalent among those with low socioeconomic status (Krishna et al., 2009 [1b]). Communication with patients and families can be challenging when there are frequently changing phone numbers and cell phone carriers (Chen et al., 2008 [2a]). Local clinicians report that for some patients and families there are financial strains that limit the amount of cell phone minutes available for talking and the use of more affordable text messaging can be the only way to communicate.

Applicability Issues:

It is important to assess patient/family preference for the form of communication for appointment reminders, as not everyone has a cell phone or unlimited text messaging service on their phone (Krishna et al., 2009 [1b]).

Members of the health care team will need to partner with patients and families to keep mobile phone numbers current (Chen et al., 2008 [2a]).

The other important consideration is confidentiality and how the text message is sent. Staff are advised to NOT text message a patient or family member of a patient with a personal cell phone, as this violates boundaries and can lead to confusion about how to reach staff when needed (Leong et al., 2006 [2b]).

To maintain confidentiality, it is best for text messages to patients and families to not include protected health information (Leong et al., 2006 [2b]).

Text messaging can be individualized to the requested time of day for each patient, and possibly several times of day, to be most effective and meet patient and family preference (Strandbygaard et al., 2010 [2a]).

Electronic messaging is a fast changing phenomenon and recommendations about this form of communication need to be revisited frequently.

Outcome or Process Measures:

There is an opportunity to improve patient safety by offering text messaging as appointment reminders as well as to improve treatment adherence; improved disease management can lead to safer use of medications and less opportunity for needing to seek urgent care. Possible outcome measures may include reduced hospitalizations, better symptom management as measured by disease specific standardized control measures, quality of life measurement scales, and other disease/problem specific objective measures of health outcomes. Medication adherence is often measured by self-report, determining how often medications are refilled, and for some medications, by the levels of medication in the patient's system.

For those that prefer text messaging as a form of communication, offering this reminder option is supportive of a family-centered care philosophy.

Improving clinic attendance decreases costs (such as underutilized resources that can result from a high clinic no show rate) and increases revenue with increased patient care and billing opportunities. This can be measured by decreased no-show rates for clinic appointments.

Search Strategy:

The following words were used in the literature search:

Asthma, medication adherence, electronic reminders, Reminder Systems/ or Cellular Phone/ or text message/ or Communication, Office Visits/ or Ambulatory Care/ or "Appointments and Schedules"/, SMS, Outpatient Appointment attendance, Pulmonary, Cystic fibrosis, Medical appointments

Databases: PubMed, Medline, Cochrane Collaboration, CINAHL Plus, Google Scholar, inquiry through NACHRI listserv.

Filters: Only articles in English were reviewed.

Date Range: 2006-2012

Last search: 12/5/11

Relevant CCHMC Evidence-Based Documents:

The "User Standards for CCHMC Information Technologies" document dated November 14, 2011, Section 2.8 provides the following instruction for CCHMC staff: "Do not instant message and/or text CCHMC Confidential Information unless

you are using a specific program or CCHMC cell phone issued for that purpose and that encrypts the message.” To comply with this, staff is encouraged to not text a patient or family from the staff person’s personal cell phone. This is found in the Information Protection, Security, & Integrity, Policy number INFO-100.

Group/Team Members:

Group/Team Leader: Allison Whisenhunt, LISW-S, Social Worker III, Division of Pulmonary Medicine

Other group/team members: Mary Ellen Meier, MSN, RN, CPN, Evidence-Based Practice Mentor, Center for Professional Excellence-Research and Evidence-Based Practice

Conflicts of Interest were declared for each team member:

- No financial conflicts of interest were found.
 The following financial conflicts of interest were disclosed:

Note: **Full tables of evidence grading system available in separate document:**

- [Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality](#) (abbreviated table below)
- [Grading a Body of Evidence to Answer a Clinical Question](#)
- [Judging the Strength of a Recommendation](#) (abbreviated table below, dimensions table above)

Table of Evidence Levels (see note above)

Quality level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

†a = good quality study; b = lesser quality study

Table of Recommendation Strength (see note above)

Strength	Definition
It is strongly recommended that... It is strongly recommended that... not...	There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations).
It is recommended that... It is recommended that... not...	There is consensus that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation...	

Copies of this Best Evidence Statement (BEST) and related tools (if applicable, e.g., screening tools, algorithms, etc.) are available online and may be distributed by any organization for the global purpose of improving child health outcomes.

Website address: <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/best.htm>

Examples of approved uses of the BEST include the following:

- copies may be provided to anyone involved in the organization’s process for developing and implementing evidence based care;
- hyperlinks to the CCHMC website may be placed on the organization’s website;
- the BEST may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at EBDMinfo@cchmc.org for any BEST adopted, adapted, implemented, or hyperlinked by the organization is appreciated.

Please cite as: Cincinnati Children's Hospital Medical Center: Best Evidence Statement -Electronic Reminders to Address Adherence, <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/best.htm>, BES^t 123, pages 1-6, 3/29/12.

This Best Evidence Statement has been reviewed against quality criteria by 2 independent reviewers from the CCHMC Evidence Collaboration.

For more information about CCHMC Best Evidence Statements and the development process, contact the Evidence Collaboration at EBDMinfo@cchmc.org.

Note

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.