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## Text Messaging Appointment Reminders to Reduce No-Shows: A Pilot Study

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The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Assistant Dean for MSN and DNP Studies, on behalf of the program; we verify that this is the final, approved version of the student's DNP Project including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Cameron M. Stephenson, Student

Dr. Nora Warshawsky, Advisor

Final DNP Project Report  
Text Messaging Appointment Reminders to Reduce No-Show Rates: A Pilot Study

Cameron M. Stephenson

University of Kentucky  
College of Nursing  
April 20, 2016

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## Dedication

This work and the completion of my DNP is dedicated to my wife and children who have stood by my side throughout all the years of schooling. Their loving support, encouragement and patience kept me going through the good and bad times seeing me to the finish. I love you.

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## Text Messaging Appointment Reminders to Reduce No-Show Rates: A Pilot Study

Hospital and outpatient clinic no-show, did not cancel or did not attend rates are a problem inherent in the United States healthcare system, international healthcare as well as locally. No-shows are costly to the organization; are burdensome on organizational productivity, the healthcare system and the needs of other patients; they are also a missed opportunity for the patient to receive care, scheduled immunizations and preventive screenings; and, they reduce access to care (Perez et al., 2014).

Bluegrass Pediatrics and Internal Medicine (BPIM), located in Georgetown, KY is no exception to patient no-show events. The clinic has four providers comprised of three physicians and one pediatric nurse practitioner. From June to December 2014 there were approximately 1400 no-show appointments that could have been used or reallocated for another patient. In addition to wasting the appointment time, an unfilled appointment becomes wasted productivity time for the provider, a missed opportunity for provider/patient maintenance of care, and is financially burdensome on the organization. The average charge of routine priority exams during this time period was \$100 with approximately \$40-50 paid by the insured and the insurer. This has the potential to be \$56,000-70,000 in losses based on payment or \$140,000 in charges (R. Davis, personal communication, April 3, 2015).

In addition to the burdens mentioned above and the financial costs, other intangible results and poor patient outcomes occur. No-show appointments without proper cancellation reduces clinic efficiency and misuses medical and administrative resources. Continuity of care, face-to-face interaction, preventive screenings and immunizations are missed when no-show appointments occur (Gurol-Urganci et al., 2013). Medication management for chronic problems such as ADHD or asthma are missed; and, timely and appropriate care is delayed. This care is

often sought elsewhere at a less than ideal location such as urgent care centers whose staff have suboptimal pediatric care knowledge and are not up-to-date on pediatric clinical practice guidelines (Perron et al. 2010). Additionally, many chronic diseases that are treated at urgent care centers are simply temporary fixes and follow-up with a primary care provider is often delayed or not sought. These problems can lead to misdiagnosis and poor medication management (Perez et al., 2014 & Perron et al., 2010).

BPIM uses administrative staff to place appointment reminder calls to routine priority appointments (i.e. well, routine and established appointments) one to two days prior to the appointment. According to Perez et al., (2014) there are several problems inherent with this method: staff time commitment; staff not completing this responsibility due to other time constraints; inability to make contact; patients screening calls and choosing whether or not to answer; or, leaving a message and not being able to verify if it was received. These problems often lead to unnecessary financial burdens; staff frustration by using a time consuming and ineffective phone reminder process; and, neglect of other essential job responsibilities.

Recent systematic reviews by Gurol-Urganci, de Jongh, Vodopivec-Jamsek, Atun, and Car (2013); Hasvold and Wootton (2011); and, Guy et al. (2012) reviewed eight, twenty-nine and, eighteen studies respectfully evaluating the effect text messaging appointment reminders had on reduction in no-show rates. Each systematic review graded the reviewed studies on a scale of one, indicating strong supporting evidence, to five indicating low supporting evidence on the efficacy of text messaging. Cumulatively the strength of the evidence ranged from moderate (3 on a scale of 1-5) to low (5 on a scale of 1-5) supporting the use of text messaging reminders to reduce clinic no-show rates. In addition, in his systematic review that evaluated text messaging on several outcomes in healthcare including reducing no-show appointments,

Househ (2014) concurred with previous systematic reviews that the literature contained moderate (3 on a scale of 1-5) to low (5 on a scale of 1-5) evidence based on study type in support of text messaging to reduce no-show rates. Perron et al. (2010) conducted a randomized control trial and found a nearly three percent more reduction in the no-show rate with text messaging reminders when compared to phone call or postal reminders during their three month study period ( $p < 0.005$ ). As well, a quasi-experimental pilot study by Branson, Clemmey, and Mukherjee (2013) realized a 64.9% appointment attendance rate in the experimental group that received text message reminders compared to a 49.3% ( $p < .05$ ) attendance rate in the control group that did not receive the reminder.

The studies evaluated above found that text messaging was effective in reducing no-show rates, however the authors also recognized that the literature contained several limitations and gaps. The most important gaps in the literature are that there are few randomized control trials (RCTs) or well-designed RCTs; studies contained information and data that was not applicable or beyond the scope of reminder systems; or, they were simply poor quality and questionably peer-reviewed (Gurol-Urganci et al., 2013; Guy et al., 2012; Hasvold & Wootton, 2011; Househ, 2014).

The lack of strong experimental design is likely related to difficulty in blinding given the interaction inherent in text messaging. This introduces a potential for study bias and decreases study strength (Gurol-Urganci et al., 2013). Additionally, Gurol-Urganci et al. (2013) suggest that the risk of harm due to the potential for misinterpretation of text messaging; transmitting inaccurate messages; loss of verbal and non-verbal cues; potential privacy disclosures or violations; and, delays in message delivery may be a contributing factor in why study authors choose alternative, lower quality study designs and avoid text message reminder system

interventions. Authors in each study call for more well-designed RCTs to be conducted not only to further strengthen the body of evidence in reducing no-show appointments, but to also study health outcome variables impacted as a result of attending or missing an appointment (Guro-Urganci et al., 2013; Guy et al., 2012; Hasvold & Wootton, 2011; Househ, 2014).

Ellis and Jenkins (2012); and, Daggy et al., (2010) also studied and suggest that factors in addition to health outcomes and the efficacy of text messaging appointment reminders be further explored. Factors such as marital status, insurance status, gender, age and race had variable effects on no-show rates. For example, Daggy et al., (2010) found that younger (<50), single, privately insured adults were more likely to no-show an appointment compared to older (>50), married, publicly (government) insured adults ( $p < 0.0001$ ). These factors can lend valuable information and insight into potential reasons why patients no-show an appointment.

### **Objectives**

The overall goal of this quality improvement project is to implement a text messaging appointment reminder system to reduce the no-show rate of BPIM by two percent and evaluate additional factors associated with no-show appointments. For this evaluation of the quality improvement project, the following objectives have been established:

1. to determine what effect text messaging has on appointment attendance, annual well/physical exams, routine and established appointment types will be messaged 24 hours prior to appointment time; and,
2. to evaluate the cost-benefit and utility text messaging has on overall clinic productivity and provide recommendations for BPIM.

## Methods

The project included three components, a three week pre-intervention evaluation, a three week pilot intervention and a three week post-intervention analysis. The sample was obtained from the patient panel at Blue Grass Pediatrics and Internal Medicine, Georgetown, KY which included all ages, male and female, ethnically diverse and those having priority routine appointments (i.e. well, routine or established appointments). Other participants included acute visits that were scheduled more than 24 hours prior to appointment time. Appointments scheduled within 24 hours of their appointment whether priority routine appointments or acute appointments were excluded from the project.

Participants that had appointments scheduled prior to 24 hours of their appointment time were identified in the clinic electronic medical record (EMR) daily schedule. Cellphone numbers were obtained and a text message was sent informing the patient of their appointment time, requesting to reply 'C' to confirm their appointment or to call the clinic to cancel or reschedule their appointment; no cancellations or reschedules were accepted via text message. Those phone numbers that were identified as landlines rather than cellphones were contacted through the usual standard of practice of a voice call. One student intern and the principal investigator manually sent text message reminders with the use of AT&T *Go* phones.

Data was collected for fifteen business or clinic days (Monday through Friday) for a total of three clinic weeks during December 2015 to evaluate pre-intervention appointments and no-shows. Data was collected for fifteen clinic days during February 2016 to evaluate the intervention; and, data was collected for fifteen clinic days during March 2016 to evaluate post-intervention appointments and no-shows. The clinic EMR was accessed daily to track the total number of text messages sent; the number of text message confirmations and how many of those

kept their appointment; the number of text messages sent with no reply confirmation and the number of those that kept their appointment; the number of text messages sent with appointment confirmation and the number of those appointments not kept; and, the number of messages sent with no appointment confirmation and the number of those appointments not kept. This project protocol was reviewed by the Institutional Review Board at the University of Kentucky and was determined to be a quality improvement project.

## **Results**

### **Impact on Appointment Attendance**

The overall percentage of no-show appointments for December 2015, February 2016 and March 2016 was 12%, 10% and 13%, respectively (Figure 1). This shows a 2% reduction in the no-show appointment rate during the text messaging intervention period compared to the previous evaluation period. Following the text messaging intervention when appointment reminders returned to phone call reminders, an increase of 3% over the study period is noted with a 1% increase over the pre-intervention period.

Out of 736 appointments during December 2015 that were eligible to receive an appointment reminder, 141 no-showed their appointment. Of the 141 no-show appointments 32% of those verbally confirmed their appointments, 32% did not answer, 21% were left a voicemail, 10% had no documentation in the EMR that a reminder was attempted; and 5% had a disconnected or unreachable phone number. Total aggregate (including sick/acute visits) appointments was 1,154 with an overall 12% no-show rate.

During the February 2016 text messaging intervention period, 600 appointments were eligible to receive an appointment reminder via text. Of those appointments eligible to receive a text message 577 actually were sent a text message with the other 23 likely oversights by the

user sending text messages. Ninety-three appointments eligible to receive a reminder but did not have text message capability received the standard phone call reminder. Total appointment attendance during the project period was 68% with the other 32% either no-showing their appointment, canceling or rescheduling. Out of 577 appointments eligible to receive a text message, 39% replied confirming their appointment, while 61% did not reply to the text message. Of those who confirmed their appointment, 82% attended their appointment; 18% replied to the text message confirming their appointment but did not attend their appointment either no-showing or later canceling over the phone with office staff. 58% of those sent a text message and did not confirm their appointment, actually did attend their appointment; 42% of those sent a text message and did not confirm their appointment, also did not attend their appointment. Total aggregate no-shows including all appointments during the month of February 2016 was 115 out of 1,060 total appointments or 10%.

Following the text messaging study period, appointment reminders returned to the standard phone call and three clinical weeks were evaluated during March 2016. Of 677 phone call reminders, 13% did not attend their appointment; 3% confirmed their appointments and then did not attend while 10% did not confirm and did not attend. Total appointments during the 3 week post-intervention period numbered 1,123 with 150 no-shows for an overall no-show rate of 13% (Table 1).

### **Financial Impact**

The financial impact and cost-benefit of the text messaging project is evident when applying the no-show rate reduction goal of the project (2%) to December 2015 data. When applying this 2% no-show rate reduction to December 2015, there would have been a net of 115 saved appointments. Subtracting this from the total no-show rate for December 2015 (141), this

would provide a net no-show reduction of 26 appointments. The average charge of \$100 per appointment multiplied by 26 net no-shows produces \$2,600 in net savings. However, the average payment of \$45 actually received when applied would produce \$1,170 in net savings. The cost of monthly text messaging systems can range between \$100-400. Subtracting this amount of \$400 from the net savings produces a net benefit increase between \$770-2,200. The cost-benefit is found when the net benefit increase is divided by the total amount of the text messaging service. At its lowest, the cost-benefit is 1:2, or for every \$1 spent, \$2 is saved; at its highest, the cost benefit is 1:6-for every \$1 spent, \$6 is saved (Table 2).

### **Discussion**

The effectiveness of text messaging in reducing appointment no-shows is evident in the overall reduction (2%) between the pre-intervention and intervention period. It is further supported when after the discontinuation of text messaging, the no-show rate increased to 3% above the study period.

Text messaging offers a simple, automatic reminder and even without a reply confirmation it was shown that a high percentage still attended their appointments. Of those who confirmed their appointments 82% attended while another 58% who received a text message but did not confirm, still attended their appointment. This can lead to the interpretation that a large majority of those receiving text messages, whether they replied or not, actually saw the text message and were reminded of their appointment. Patients who receive phone calls reminders often screen their calls and choose not to answer for one of several reasons or are unable to answer their phone. With text messaging, it is an instant message pop-up on the phone screen and visibility and receipt has a high probability; these messages cannot be screened or refused.

As previously discussed, no-show appointments are costly and burdensome on the organization, providers and staff. This reduction of 2% can lead to a potential increase of \$2,600 in charges billed, and payments received from \$1,170 to \$2,200. Overtime this adds up to a significant cost-benefit to BPIM.

This project utilized one paid student intern and the principal investigator to manually enter each cellphone number and send the appointment reminder. At 577 text messages, this was a time consuming task equaling approximately 20 total hours spent sending appointment reminders. However, the cost of this process was a mere .04-.05% of the overall potential increase with the reduction in no-show appointments. Admittedly this is not the best use of staff and resources for long term text messaging use but was necessary at this time to complete the project. Most text messaging systems are completely automated and are easily integrated into the current EMR and require little staff time and monitoring. Quality text messaging services with EMR integration cost on average from \$100 to \$400 per month depending on the desired depth of services. Again, this is a cost that is easily absorbed with a cost-benefit ratio of up to 1:6 when the no-show rate reduces. Keep in mind that this cost-benefit uses the most costly of text messaging services; the cost benefit would be increased several fold when using a more economic, less-expensive service. Finally, the EMR that BPIM uses already has text messaging functional capability, so adding a standalone, costly text messaging software package would be unnecessary

### **Limitations**

This project had some limitations. While current evidence-based research lacks well-designed randomized control trials and recommends that more be conducted, this was unfeasible for the purposes of this project so convenience sampling was utilized. The use of staff members

to send text messages inevitably can lead to potential errors or mistakes such as 23 eligible appointments not receiving a text message. Two days during the February 2016 project period were noted as severe weather days which could have led to fewer total appointments and an increased no-show or cancellation rate. Additionally one clinic afternoon was cancelled due to severe weather; this has the potential to skew the data but this would be expected to only affect the outcome by a small fraction. Finally, there is no way to be certain that those who did not respond to the text message ever received the text message reminder in the first place causing some uncertainty in data validity.

### **Recommendations and Conclusion**

Text messaging is an effective technological advancement that has been shown to be effective in reducing no-show appointments. Staff time and resources can be used more effectively on other necessary tasks when an automated text messaging system is utilized. Relying on staff members to call and remind patients of their appointments is an inefficient use of staff time. Sickness, days off or vacation days severely reduces the number of appointment phone reminders that are placed, particularly if other staff members do not pick up the extra work. BPIM should consider implementing a fully automated text messaging system to reduce their no-show rate over the long-term. The potential cost-benefit (\$6 returned for \$1 spent) realized during the project period and that could be realized over the long term will more than pay for the cost of monthly text messaging charges.

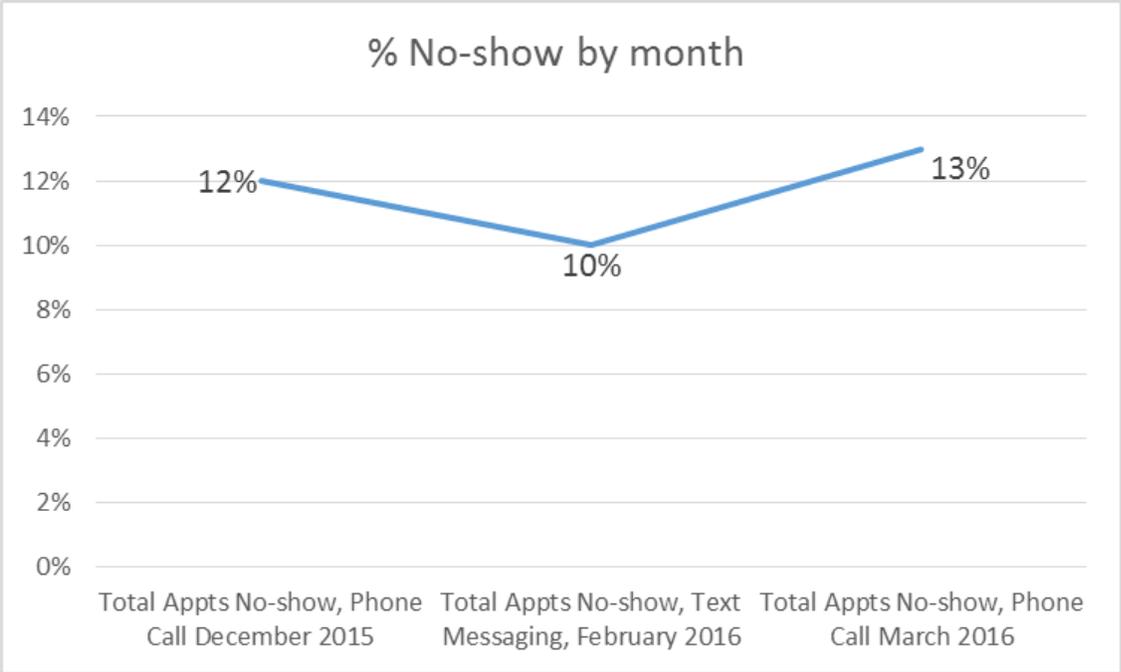


Figure 1. % No-show by month.

*Table 1. Monthly comparison*

	December 2015		February 2016		March 2016	
	n	%	n	%	n	%
Total Appointments	1154		1060		1123	
Total Appt* Reminders	736	64	669	63	677	59
Total No-Show Appts	141	12	115	10	150	13
Total Appt Confirm and No-Show	44	31	23	20	18	12
Total Appt with No answer/reply and No-Show	45	32	92	80	71	47

Comparison of appointments, attendance and no-shows.

\*Appt=Appointment

Table 2. Cost-benefit analysis

Cost-Benefit/Goal: Reduce No-show Rate by 2%	
Total No-Show Events December 2015  141	
No-Show Financial Burden \$14,100 loss based on average charge of \$100/appt., Dec. 2015 (141 no-show events x \$100) \$6,345 loss based on average payment of \$45 (141 no-show events x \$45)	\$6,345-14,100
Net No-Show Reduction  1,154 appointments @ 10% no-show rate (12% December 2015 no-show Rate with 2% reduction) = 115 net saved appointments; 141 no-show events – 115 net saved appointments = 26	26
Net Savings  26 x \$100/appointment charge = \$2,600  26 x \$45 average appointment payment = \$1,170	\$1,170-2,600
Net Benefits  \$2,600 net savings - \$400 monthly text messaging cost = \$2,200  \$1,170 - \$400 monthly text messaging cost = \$750	\$770-2,200
Cost:Benefit (C:B) ratio  \$2,200 ÷ \$400 = 1:6  \$770 ÷ \$400 = 1:2	1:6

Cost-benefit potential of \$6 returned for every \$1 spent.

## References

- Branson, C. E., Clemmey, P., & Mukherjee, P. (2013). Text message reminders to improve outpatient therapy attendance among adolescents: a pilot study. *Psychol Serv, 10*(3), 298-303. doi: 10.1037/a0026693
- Daggy, J., Lawley, M., Willis, D., Thayer, D., Suelzer, C., Po-Ching, D.,...Sands, L. (2010). Using no-show modeling to improve clinic performance. *Health Informatics J. 16*(4), 246-259. doi: 10.1177/1460458210380521
- Ellis, D.A., & Jenkins, R. (2012). Weekday affects attendance rate for medical appointments: Large-scale data analysis and implications. *Plos One, 7*(12): e51365. doi: 10.1371/journal.pone.0051365
- Gurrol-Urganci, I., de Jongh, T., Vodopivec-Jamsek, V., Atun, R., & Car, J. (2013). Mobile phone messaging reminders for attendance at healthcare appointments. *Cochrane Database of Systematic Reviews, (12)*. Retrieved from doi:10.1002/14651858.CD007458.pub3
- Guy, R., Hocking, J., Wand, H., Stott, S., Ali, H., & Kaldor, J. (2012). How effective are short message service reminders at increasing clinic attendance? A meta-analysis and systematic review. *Health Serv Res, 47*(2), 614-632. doi: 10.1111/j.1475-6773.2011.01342.x
- Hasvold, P. E., & Wootton, R. (2011). Use of telephone and SMS reminders to improve attendance at hospital appointments: a systematic review. *Journal of Telemedicine and Telecare, 17*(7), 358-364. doi: 10.1258/jtt.2011.110707
- Househ, M. (2014). The role of short messaging service in supporting the delivery of healthcare: An umbrella systematic review. *Health Informatics J.* doi: 10.1177/1460458214540908
- Perez, F. D., Xie, J., Sin, A., Tsai, R., Sanders, L., Cox, K., . . . Park, K. T. (2014). Characteristics and Direct Costs of Academic Pediatric Subspecialty Outpatient No-Show Events. *Journal for Healthcare Quality, 36*(4), 32-42. doi: 10.1111/jhq.12007
- Perron, N. J., Dao, M. D., Kossovsky, M. P., Miserez, V., Chuard, C., Calmy, A., & Gaspoz, J. M. (2010). Reduction of missed appointments at an urban primary care clinic: A randomised controlled study. *BMC Fam Pract, 11*, 79. doi: 10.1186/1471-2296-11-79