



## **Text Messaging In Health Care Improving Outcomes. Changing Behavior. Saving Money.**

**A Research Summary by Dr. Vishal Mehta**

Text (SMS) messaging has become a preferred mechanism of communication in modern society. It has continued to gain popularity over the course of the past decade and shows no sign of slowing down. In fact, of the 4.1 billion cellular phone subscribers worldwide, an estimated 3.05 billion use text messaging. Text messaging is now the most used communication tool on the planet exceeding email and instant messaging. As of 2011, some 83% of American adults own cell phones and three-quarters of them (73%) send and receive text messages. The usage numbers in a younger segment of society are even more impressive. Fully 95% of 18-29 year olds use text messaging and these users send or receive an average of 87.7 text messages on a normal day.<sup>1</sup>

### **Text Messaging in Health Care**

Text messaging in health care started with routine appointment reminders. It quickly became evident that patients preferred to receive much of their health care updates and reminders via text.<sup>21</sup> It has been clearly demonstrated in several studies that mobile calling or texting is the preferred route of communication and that access to the physician by means of mobile technology is highly desirable.<sup>5, 7</sup> Challenor et al found that mobile phone/text messaging was by far the most popular method by which patients wished to be contacted with 62% of patients preferring this method of communication.<sup>7</sup> Furthermore, there is now convincing data that text messaging can influence health behavior and decisions.<sup>3,15</sup> These facts, combined with the time saving potential for health care providers, make text messaging a promising new technology for the health care field that is likely to see increasing adoption in the coming years. The current use of text messaging within health care can be broken down into 5 segments: 1) appointment and medication reminders, 2) preventative health, 3) population awareness, 4) education around diseases, conditions and procedures, and 5) pain management.

### ***Appointment and Medication Reminders***

Text messaging has proven to be an effective way to remind patients of their appointments.<sup>27</sup> Cohen et al assessed 350 consecutive patients to a genitourinary clinic to determine their preferences about receiving appointment reminders. The overwhelming majority (88%) chose to receive appointment reminders via text messaging.<sup>8</sup> The ability of text messaging to improve attendance rates in a family practice clinic has also been studied. In a randomized controlled trial, text messaging was found to produce a statistically significant increase in attendance equal to manual phone calls while incurring only half the costs of the manual phone calls.<sup>17</sup> “No-show” rates decreased nearly 10% (14.2% vs 23.4%) compared to the control group.<sup>9</sup>

Text messaging has also been found to be an effective way of improving medication compliance. Medication compliance is of utmost importance for many chronic conditions. Yet, patients often do not take their medications as prescribed. This is often due to simply forgetting to take the medication or not understanding the importance of taking the medication. Text messaging has the ability to remind patients to take their medications and to remind them of the importance of taking these medications as well. This is particularly important in chronic conditions such as diabetes, transplant recipients, HIV, hypertension and others. Dowshen et al demonstrated that text messaging improved medication compliance and laboratory results of HIV positive patients on anti-retroviral therapy.<sup>10</sup> Similarly, significantly improved rates of adherence with patients taking diabetes medications and beta-blockers for hypertension has also been demonstrated.<sup>2</sup> Another study examined patients who had recently undergone liver transplant and were required to be on immunosuppressants to avoid rejection. The addition of a text messaging reminder system was found to significantly increase compliance and actually reduce incidence of rejection.<sup>20</sup> In a recent randomized controlled trial from Columbia University, text messaging increased compliance with oral contraceptives from 54% to 64%.<sup>6</sup>

### ***Public Health***

The public health sector has been quick to embrace the use of text messaging.<sup>30</sup> The main reason for this is the ability for text messaging to reach a large segment of the population quickly at low cost. The use of text messaging in this manner varies from monitoring the influenza rate in Madagascar to helping raise awareness about sexually transmitted diseases and sexual health.<sup>18, 23</sup> One of the great successes has been the Text4Baby campaign. Expecting mothers text in their due date and receive important prenatal information and help finding resources.<sup>11</sup> The hope is that this will lead to healthier mothers and babies by making expectant mothers aware of simple interventions that can be taken during pregnancy to decrease the risks of adverse outcomes. Similarly, success has been seen in programs designed to help patients lose weight or quit smoking. In a randomized controlled trial, Free et al evaluated the 6 month abstinence rate of those trying to quit smoking with one group randomized to receive text messages and one group serving as the control. They found that the text messaging group had an abstinence rate of double the control group (10.7% vs 4.9%).<sup>12</sup> Many other studies also demonstrate efficacy in using text messaging in smoking cessation.<sup>4, 14, 22, 25</sup> Data demonstrating the efficacy of text messaging for weight loss is mounting but less robust than with smoking cessation.<sup>13,</sup>

<sup>16, 28, 31</sup> Shapiro et al performed a randomized controlled trial examining the effects of a text messaging program on weight loss at 6 and 12 months.<sup>26</sup> While they did not demonstrate a statistically significant difference in weight loss between the two groups, they did demonstrate that those who were most adherent with the text messages lost the most weight. There has also been a great deal of interest in using text messaging to notify the population about flu vaccinations. A recent study examined the use of a text messaging flu vaccination awareness program on 9213 low-income children and adolescents. The messages provided parents with educational information and instructions regarding Saturday vaccination clinics. By the end of the study period, the group receiving the messages was found to have a statistically higher rate of receiving the vaccination than the control group.<sup>29</sup>

### ***Diseases/Conditions/Surgeries***

On any given day, thousands of people within the United States receive a new diagnosis or undergo a procedure. Education around these procedures is crucial to avoiding complications and optimizing outcomes. Traditionally this education has been performed by giving paper hand-outs to patients for them to read and review. Recently many providers have sought to provide this education electronically by sending materials via e-mail and/or text messages. This has been spurred on by several events including the adoption of electronic health records, the growing popularity of smart phones and the realization of the many advantages of electronic delivery. Electronic delivery of educational information to a smart phone allows patients to receive pertinent information at the right time points during their care and recovery and ensures information is always close at hand. A recent study examined the use of a text messaging system to inform patients after breast cancer surgery. The use of text messaging resulted in a decrease in clinic visits, a decrease in days requiring a drain in place and improved clinic efficiency.<sup>24</sup> Improved medication adherence and outcomes were also seen with the use of text messaging after pediatric liver transplant surgery.<sup>20</sup> A similar program has found early success at The Pediatric Heart Transplant Program at New York-Presbyterian/Morgan Stanley Children's Hospital.

### ***Pain Management***

The use of text messaging in the field of pain management also holds tremendous promise. One of the main challenges in pain management is narcotic addiction. A text messaging platform can be used to communicate educational information about narcotic usage. In addition, information about narcotic dependency can be sent to the patient and their family so that these issues can be detected earlier when they are easier to treat. Moreover, users can be directed towards surveys that are designed to elicit any evidence of early narcotic dependency. Answers to these surveys can then be used to trigger individual follow-up. Text messaging can also be used direct pain patients to alternative therapies such as meditation and relaxation techniques and to walk patients through the post-procedure period after injections.

## The Healthy-TXT Platform

Healthy-TXT is a customizable platform that allows users to receive automated messages around any event. These events range from a new diagnosis (e.g. diabetes) to taking a new medication (e.g. safe narcotic use program). The messages can be sent via email and/or text message and are completely customizable. Messages may include up to 160 characters which can link to a web page, PDF or video file. In this fashion, engaging multi-media programs can be created around health events. Patients can sign up by texting in a keyword or registering on-line. Healthy-TXT is completely HIPAA compliant.

Healthy-TXT has been used to educate patients after surgical procedures and to help patients through episodes of back pain. In addition, Healthy-TXT, in collaboration with the American Orthopedic Society for Sports Medicine (AOSSM), launched a successful campaign to educate young football players about the symptoms of concussions and how to seek help. Healthy-TXT has also been used to send parenting tips, advice and reminders to new parents.

It has been clearly demonstrated that text messaging can influence behavior for the better around disease conditions and procedures. The implications for this technology are immense. Programs can be created around wellness, medication use and new diagnoses in almost any setting. Users can be educated in a convenient, efficacious and low cost fashion with messages that are custom created for the intended use. This should result in a decrease in recovery times and a lower incidence of preventable diseases.

The implementation experience with Healthy-TXT has also been studied.<sup>19</sup> Staff experience was positive with no extra time required to use the system. Staff's greatest satisfaction point was decreased inbound patient inquiries. Patient experience was positive and patients reported their greatest satisfaction points as being: questions answered before they arose via text message, feeling in touch with physician, ability to keep entire family informed of expected progress and restrictions. In this study, there were also several benefits from the stand point of the health care provider. As physicians are increasingly required to do more in less time, any time saving measures are critically important. Much of a physician's time is spent answering questions during the post-surgically or after procedures. Many of these questions are the same or similar questions asked by different patients. By incorporating the answers to these questions into automated messages, the patients' questions are answered before they are asked saving time for the physician and staff thereby increasing patient satisfaction. Another similar benefit that was noted was the ability to add and modify a message including a video message at any time. An example of this benefit found during this study concerns brace wear. Patients had several questions regarding the fit and use of the post-operative ACL brace. A video was made demonstrating the proper fitting and use of the brace and incorporated into the automated program. This allowed patients the ability to refer to this video "on demand" and saved time which would have consumed office and staff resources in bringing these patients back to demonstrate proper fit and usage. Patient feedback to the automated ACL text messaging system was very positive. Patients seemed most happy about now receiving their information on their mobile device and no longer having to keep track of and sift through a large folder for 6

months. In addition, they reporting feeling more “in touch” with their physicians and more informed about their post-operative restrictions and activities. It should be mentioned that as we move towards a “pay-per-performance” environment, patient satisfaction and communication becomes ever more important as it will be a key factor that is measured in the performance of physicians.

## Conclusion

Text messaging has convincingly been show to have significant positive effects in promoting wellness, medication compliance and safe usage, following procedures and in preventative medicine. The Healthy-TXT platform combines the aforementioned benefits of text messaging with video messaging and email capabilities, in addition to the patient opting in other members of their family to increase adherence to therapy. The proven efficacy of this platform combined with the low cost structure should allow for health care system, health departments, insurance carriers, employers, PBMs and other stake holders to promote healthy behavior and awareness thereby improving health, reducing sick days and decreasing unnecessary office and emergency room visits.

## REFERENCES

1. The Pew Research Center's Internet & American Life Project.
2. Abrams LC, Ahuja M, Kodl Y, et al. Text2Quit: results from a pilot test of a personalized, interactive mobile health smoking cessation program. *J Health Commun.*17 Suppl 1:44-53.
3. Armstrong AW, Watson AJ, Makredes M, Frangos JE, Kimball AB, Kvedar JC. Text-message reminders to improve sunscreen use: a randomized, controlled trial using electronic monitoring. *Arch Dermatol.* Nov 2009;145(11):1230-1236.
4. Bennett DA, Emberson JR. Text messaging in smoking cessation: the txt2stop trial. *Lancet.* Jul 2;378(9785):6-7.
5. Burstein HJ. Texting the doctor. *J Natl Compr Canc Netw.* May;9(5):459.
6. Castano PM, Bynum JY, Andres R, Lara M, Westhoff C. Effect of daily text messages on oral contraceptive continuation: a randomized controlled trial. *Obstet Gynecol.* Jan;119(1):14-20.
7. Challenor R, Deegan S. What service users want: a new clinic results service. Can we satisfy both patients' needs and wants? *Int J STD AIDS.* Oct 2009;20(10):701-703.
8. Cohen CE, Coyne KM, Mandalia S, Waters AM, Sullivan AK. Time to use text reminders in genitourinary medicine clinics. *Int J STD AIDS.* Jan 2008;19(1):12-13.
9. Downer SR, Meara JG, Da Costa AC. Use of SMS text messaging to improve outpatient attendance. *Med J Aust.* Oct 3 2005;183(7):366-368.
10. Dowshen N, Kuhns LM, Johnson A, Holoyda BJ, Garofalo R. Improving adherence to antiretroviral therapy for youth living with HIV/AIDS: a pilot study using

- personalized, interactive, daily text message reminders. *J Med Internet Res.*14(2):e51.
11. Evans WD, Abrams LC, Poropatich R, Nielsen PE, Wallace JL. Mobile health evaluation methods: the Text4baby case study. *J Health Commun.*17 Suppl 1:22-29.
  12. Free C, Knight R, Robertson S, et al. Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomised trial. *Lancet.* Jul 2;378(9785):49-55.
  13. Gerber BS, Stolley MR, Thompson AL, Sharp LK, Fitzgibbon ML. Mobile phone text messaging to promote healthy behaviors and weight loss maintenance: a feasibility study. *Health Informatics J.* Mar 2009;15(1):17-25.
  14. Haug S, Meyer C, Schorr G, Bauer S, John U. Continuous individual support of smoking cessation using text messaging: a pilot experimental study. *Nicotine Tob Res.* Aug 2009;11(8):915-923.
  15. Krishna S, Boren SA, Balas EA. Healthcare via cell phones: a systematic review. *Telemed J E Health.* Apr 2009;15(3):231-240.
  16. Lang L. Text messaging may help children to fight off obesity. *Gastroenterology.* Jan 2009;136(1):7-8.
  17. Leong KC, Chen WS, Leong KW, et al. The use of text messaging to improve attendance in primary care: a randomized controlled trial. *Fam Pract.* Dec 2006;23(6):699-705.
  18. Levine D, McCright J, Dobkin L, Woodruff AJ, Klausner JD. SEXINFO: a sexual health text messaging service for San Francisco youth. *Am J Public Health.* Mar 2008;98(3):393-395.
  19. Mehta V. Implementation of an Automated Text Messaging System to Educate Patients after ACL Reconstruction. *International Conference and Exhibition on Orthopedics.* August 13, 2012 2012.
  20. Miloh T, Annunziato R, Arnon R, et al. Improved adherence and outcomes for pediatric liver transplant recipients by using text messaging. *Pediatrics.* Nov 2009;124(5):e844-850.
  21. Mooney J. A survey on electronic communication in pediatric clinics. *Telemed J E Health.* Jul-Aug;18(6):454-458.
  22. Obermayer JL, Riley WT, Asif O, Jean-Mary J. College smoking-cessation using cell phone text messaging. *J Am Coll Health.* Sep-Oct 2004;53(2):71-78.
  23. Rajatonirina S, Heraud JM, Randrianasolo L, et al. Short message service sentinel surveillance of influenza-like illness in Madagascar, 2008-2012. *Bull World Health Organ.* May 1;90(5):385-389.
  24. Rao R, Shukla BM, Saint-Cyr M, Rao M, Teotia SS. Take two and text me in the morning: optimizing clinical time with a short messaging system. *Plast Reconstr Surg.* Jul;130(1):44-49.
  25. Rodgers A, Corbett T, Bramley D, et al. Do u smoke after txt? Results of a randomised trial of smoking cessation using mobile phone text messaging. *Tob Control.* Aug 2005;14(4):255-261.
  26. Shapiro JR, Koro T, Doran N, et al. Text4Diet: A randomized controlled study using text messaging for weight loss behaviors. *Prev Med.* Aug 27.

27. Sims H, Sanghara H, Hayes D, et al. Text message reminders of appointments: a pilot intervention at four community mental health clinics in London. *Psychiatr Serv.* Feb 1;63(2):161-168.
28. Stephens J, Allen J. Mobile Phone Interventions to Increase Physical Activity and Reduce Weight: A Systematic Review. *J Cardiovasc Nurs.* May 24.
29. Stockwell MS, Kharbanda EO, Martinez RA, Vargas CY, Vawdrey DK, Camargo S. Effect of a text messaging intervention on influenza vaccination in an urban, low-income pediatric and adolescent population: a randomized controlled trial. *JAMA.* Apr 25;307(16):1702-1708.
30. Szilagyi PG, Adams WG. Text messaging: a new tool for improving preventive services. *JAMA.* Apr 25;307(16):1748-1749.
31. Woolford SJ, Clark SJ, Strecher VJ, Resnicow K. Tailored mobile phone text messages as an adjunct to obesity treatment for adolescents. *J Telemed Telecare.* 16(8):458-461.