

Software-Based Postoperative Communication With Patients Undergoing Spine Surgery

Global Spine Journal
2019, Vol. 9(1) 14-17
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DOI: 10.1177/2192568217728047
journals.sagepub.com/home/gsj


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Abstract

Study Design: Observational study.

Objectives: Perioperative patient anxiety is a major concern in orthopedic surgery. Mobile messaging applications have been used in a number of healthcare settings. The goal of this project is to develop a novel mobile messaging application aimed at decreasing perioperative patient anxiety in spine surgery patients.

Methods: Postoperative recovery journals were collected from patients undergoing spine surgery. Journals were used as a framework to develop a software-messaging library. A subsequent cohort of patients received daily text messages with educational material regarding their recovery for 14 days after discharge from their operative admission. Patients ranked the usefulness of the survey on day 14; further feedback was obtained via interviews.

Results: Nineteen postoperative recovery journals were collected and analyzed. Content regarding postoperative recovery was compiled. The pilot group consisted of 21 patients. Average rating of the application on a 1 to 5 scale with 5 being “very useful” was 4.57. Of the 12 patients available for postoperative interviews, 11 felt the content of the messages was relevant. Nine of 12 patients felt the application made it less likely for them to call clinic.

Conclusions: The study presents a unique mobile phone messaging tool to offer patients support in the 2 weeks following spine surgery. The tool was felt to be useful by nearly all patients, had a high degree of patient engagement, and made the majority of patients less likely to call clinic.

Keywords

spine surgery, patient education, patient communication, messaging software

Introduction

Back- and neck-related complaints affect as much as 11% of the US population and are one of the most common presenting complaints at healthcare visits.¹ A small subset of these patients undergo spine surgery due to symptoms recalcitrant to conservative management. The utilization of spine surgery has been rapidly increasing.^{2,3} Literature on the rates of spine surgery shows significant increase between 1992 and 2003, from 2.5 per 1000 Medicare enrollees to 4.0 per 1000 Medicare enrollees. An estimated 413 000 spinal fusions were performed in the United States in 2008, accounting for almost \$34 billion in charges.²

Perioperative anxiety is a major concern for patients undergoing surgery.⁴ A study of patients undergoing total joint

arthroplasty found that one quarter of the patients in the study suffered from preoperative anxiety and an additional 44% developed postoperative anxiety.⁵ Studies have also found that anxiety increases the duration of hospital length of stay, and thereby further increases the cost of care.⁶ Perioperative

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anxiety has also been linked to worse postoperative outcomes. Wong et al describe a single preoperative 30-minute patient education session in patients undergoing orthopedic surgery for trauma-related injuries.⁷ In their study, this initiative was effective in alleviating patient anxiety and improving patient perception of self-efficacy.

Mobile phone messaging has become ubiquitous as a means of communication in modern culture and is utilized in a number of software applications including native mobile phone text messaging, stand-alone mobile phone software applications, and imbedded in popular social network platforms. A number of novel mobile phone messaging software applications have been developed for healthcare use in various settings.^{8,9} In the surgical setting, mobile phone messaging has been used to provide preoperative education modules, evaluate patient-reported outcomes, and track medication adherence after transplants.¹⁰⁻¹²

In this study, a novel mobile phone messaging patient education system was developed, aimed at informing patients of their expected postoperative course, with the goal of decreasing patient anxiety and improving patient satisfaction. The presented data are the initial results from a pilot study of this novel application.

Methods

The initial phase of our investigation involved the postoperative assessment of patients undergoing spine surgery at our institution. In an effort to understand common postoperative concerns of patients undergoing spine surgery, we provided paper postoperative recovery journals to patients. Patients were instructed to write down common daily concerns and questions over their first 14 days after spine surgery. A total of 19 journals were collected. All journal entries were transcribed using NVivo software.¹³ The content of each patient journal was coded and analyzed for recurring themes over time. Using the trends identified in patient journals, a list of primary daily concerns for each of the 14 days postdischarge was identified. The list of themes was used as a framework for the development of the software messaging library utilized in this study. Using the recovery journal thematic structure as a guideline, mobile phone messages were drafted for each of the 14 days postdischarge. All messages were written at an eighth-grade reading level or below, and contained 160 characters or fewer, meaning they would appear as a single message on a non-smart phone device. Many messages incorporated URLs to additional reading, YouTube videos, or infographics, primarily existing resources available on the university website. No custom web content was created. All messages asked whether the patient would like additional information on the topic for the day, and any positive responses were recorded and additional information was sent.

After creation of the software messaging library was complete, this resource was offered to patients undergoing spine surgery on the day of discharge. Patients enrolled in this service received daily mobile phone messages for 14 days after

discharge. On day 14 they were sent a message asking to rate the software on a 1 to 5 scale, with 1 being “not useful” and 5 “very useful.” After completion of the 14-day SMS program, patients were contacted either at their follow-up appointments or by phone to provide feedback regarding the software.

Results

A total of 21 patients undergoing spine surgery were enrolled and received daily mobile phone messages for 2 weeks following discharge from the hospital. Twelve patients were available for a follow-up interviews regarding the application. Patients’ age ranged from 34 to 78 years, and the average age was 57.8 years. Seven patients were male and 5 female. Enrolled patients underwent a broad range of surgeries including 7 lumbar laminectomy and fusions, 3 of which were revision cases, 1 multi-level lumbar fusion for degenerative scoliosis, 2 anterior cervical discectomy and fusions, 1 lumbar microdiscectomy, 1 revision posterior cervical fusion, and 1 lumbar laminectomy.

The overall feedback regarding the text messaging application was overwhelmingly positive. Of the 12 patients interviewed, 11 stated that they would recommend the application to others undergoing spine surgery, and 9 stated that they felt that the mobile phone messages made them less likely to call clinic or the on-call orthopedic surgeon. Of the 3 patients that did not feel as though the text messages decreased the likelihood of their calling clinic, 2 were revision surgeries, and the patients felt that they already had an adequate understanding of the postoperative course based on their prior experience. Eleven of 12 patients found the text message content to be relevant.

There was a high overall engagement with the application with an average 3.38 text messages per person over the course of the 2-week period sent to the software requesting additional information. The number of text messages sent from the patient to the software ranged from 0 to 16. The peak number of responses occurred on day 2 after discharge. On day 14, patients were asked to rate the application from 0 to 5 with 5 being most helpful; the average score was 4.57.

Discussion

In an era of quality assessment and cost containment, it is important to identify effective ways to communicate with patients. Mobile phone messaging has been previously utilized in surgical settings and holds promise as a low-cost communication tool.^{10,11,14} Postoperative anxiety is a significant issue effecting patients after spine surgery and has been well documented both in orthopedic and non-orthopedic patients.^{5,14,15} In order to improve the patient experience, we must look beyond surgical costs and surgical outcomes to also manage patient anxiety. The purpose of this study was to evaluate a novel mobile phone- and software-based approach to perioperative patient education in spine surgery. This initiative has the potential upsides of being longitudinal in nature, having variable length, without the human capital requirement of

educators. Our reported pilot data suggests that software communication with patients undergoing spine surgery is an accepted form of communication. The study sample included patients undergoing surgeries with a broad range of associated perioperative morbidity, ranging from a microdiscectomy to a multilevel fusion for adult degenerative scoliosis. The great majority of patients found the text messages relevant despite having highly variable postoperative courses. The overall response to the application was overwhelmingly positive. The results suggest that patients showed a high degree of engagement with the current system with frequent text messages sent to the system requesting further information. This pilot study demonstrates a high degree of acceptance of this form of communication in the postoperative setting and similar methodology should be utilized in subsequent work. Further inquiry is required to formally study the effect mobile phone software messaging may have on actually lowering patient anxiety and improving satisfaction in the postoperative setting.

Our methodology for the creation of a software messaging library was well accepted and may be utilized in future work. The utilization of patient journals to understand the needs and concerns of patients was the initial step in our development process. We feel the invested time and effort to thoroughly understand our patient population may at least be a part of the reason for the successful rating patients gave our software communication platform. Conducting appropriate patient research prior to developing software algorithms to communicate with patients is an important and integral step in the development process.

The “mobile” nature of the intervention makes it possible for the intervention to continue over periods of time when the patient is outside of the clinic or hospital setting. The timing of postoperative anxiety after spine surgery has not been studied. In the experience of the senior authors, many patients experience their peak postoperative anxiety within the first 2 weeks after discharge. This time period coincides with the largest decrease of available resources, transition from inpatient care to home, as well as persistent functional deficits and continued postoperative pain. Our presented mobile phone software-based patient education system has the potential to reach patients during this time, prior to their first postoperative visit.

This study has a number of limitations. It is a small sample pilot study of a novel patient education initiative. The presented data does not comment on the effectiveness of this intervention in alleviating patient anxiety, decreasing patient phone calls to clinic or readmissions. While patients expressed that they felt less likely to call clinic, this study does not have a control group to establish whether a decline in patient phone calls or anxiety is associated with this intervention. The study establishes a novel patient-journal-based approach to creating patient education materials, which was effectively applied to create a mobile SMS-based patient education tool. Future studies of this application will involve a multicenter randomized controlled trial to evaluate the tool's efficacy.

Conclusion

Anxiety is a significant concern affecting the perioperative recovery of patients undergoing spine surgery. The presented pilot study offers a unique mobile phone software messaging tool to offer patients support in the time period following discharge from the hospital. The mobile phone software messaging tool received overall positive feedback, was felt to be relevant by the majority of the patients, and had a high degree of patient engagement. This application has the potential to decrease postoperative patient anxiety, decrease patient phone calls to clinic, smooth the transition from the inpatient setting to home, and improve the overall patient experience. Further studies of this novel application are necessary to evaluate efficacy.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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