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THE USE OF TECHNOLOGY IN ORTHOPAEDIC SURGERY—INTRAOPERATIVE AND POST-OPERATIVE MANAGEMENT (C KRUEGER AND S BINI, SECTION EDITORS)

Using Patient Engagement Platforms in the Postoperative Management of Patients

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Abstract

Purpose of Review The purpose of this review is to contextualize the topic of patient engagement in orthopedic surgery. There will be a specific focus on patient engagement platforms and the impact on outcomes and orthopedic clinical workflows.

Recent Findings In an attempt to engage patients and optimize the orthopedic perioperative surgical home, patient engagement platforms have emerged in the form of portals, mobile health applications, and chatbots. Collectively, these platforms have improved patient satisfaction scores and outcomes.

Summary Patient portals, mobile health applications, and chatbots can engage orthopedic patients and improve the effectiveness of the perioperative orthopedic surgical home. There are specific differences in these applications that should be noted and accounted for. When deciding to incorporate one of these systems into your practice, it is paramount to identify what you are looking to improve upon within your health system and choose a platform accordingly.

Keywords Practice management · Patient engagement platforms · Perioperative orthopedic surgical home · Mobile health applications · Chatbots · Patient portals

Introduction

Patient engagement is the process of encouraging patients to become educated participants in their own care. The primary goal of such engagement is improving surgical outcomes, and a secondary benefit is potentially reducing the overall cost of care. To be successful, it requires that a patient is knowledgeable, is skillful in managing their preparation and recovery from surgery, and is provided with the appropriate communication channels to connect them to their healthcare team.

Orthopedic surgeons have traditionally engaged their patients during office consultations, through the surgical informed consent process, on bedside hospital rounds, and in postoperative clinic visits. Recently, we have added nurse navigators and educational pre-operative group teaching classes [1, 2] to aid in the optimization and preparation of patients for surgery. For the most part, these educational programs have been very effective in improving the outcomes of our patients [3]. However, the orthopedic care culture is rapidly changing. Today, orthopedic surgeons face many new challenges compared with our predecessors.

We are now tasked with providing care to a larger number of patients in the setting of a diminishing surgeon workforce (https://www.aamc.org/news-insights/press-releases/new-findings-confirm-predictions-physician-shortage). With the ubiquitous inclusion of the electronic health record (EHR), we now have less face-time with our patients during their

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clinic visits [4]. Proportionally more of our patients are having outpatient surgery (i.e. same day or 23 h stay) and we are discharging fewer patients to nursing facilities and rehabilitation centers [5]. Combined, patients are spending less time with their clinicians and more time at home.

This has led to the concept of the perioperative orthopedic surgical home, which refers to a coordinated care system that guides the patient throughout the entire surgical experience [6]. The goal is to improve clinical outcomes and provide better perioperative care, while simultaneously attempting to aid in overall cost containment. Patient engagement is a critical part of this. To achieve these aims and improve the efficacy of the perioperative orthopedic surgical home, new digital technologies are being developed. An example of these technologies is patient engagement platforms (PEPs).

Patient Engagement Platforms

Patient engagement platforms are digital health applications that are designed to automate patient outreach and keep patients engaged throughout the continuum of their care. Common PEPs include patient portals, mobile applications for android/iOS platforms, and messaging chatbots. Most PEPs can be accessed by patients on their smartphone, tablet, or computer. Patient engagement platforms can automate clinician-like tasks, including the delivery of educational content, send reminders to follow treatment protocols, report pain scores and mobility levels, collect or manage wound photos, and record and monitor health outcomes [7, 8••]. Moreover, they can make patients feel connected and cared for and, in turn, improve the patient experience and satisfaction scores. Patient engagement platforms can also help physicians enhance referrals, grow their practice, improve the care team's efficiency, improve patient and provider communication and coordination, and automate data collection [9]. In some cases, PEPs can generate revenue through Remote Patient Monitoring (CPT 99091) and help practices receive full credit for Improvement Activities under the Merit-based Incentive Payment System (https://qpp.cms.gov/mips/overview).

Perhaps the biggest advantage of a PEP is the opportunity to improve patient outcomes and reduce the cost of care. There is a growing body of research showing that PEPs may help reduce hospital length of stay, postoperative emergency room visits, hospital readmissions, and clinic visits [10, 11, 12••, 13–15, 16••, 17••, 18]. Patient engagement platforms have also been shown to reduce utilization of therapy and home care services [19–23]. Additional beneficial outcomes of PEPs include increasing patient satisfaction, reducing opioid use, and decreasing volume of patient-generated calls to the office [17••, 24]. Specifically, Roberts et al. demonstrated the promise PEPs can have for collection of patient-reported outcomes [25].

Patient Portals

Examples are the following:

1. MyChart (Epic Systems Corporation), Madison, WI
2. aethnaCommunicator (athenahealth, Inc.), Watertown, MA

Patient portals are secure online websites sponsored by a provider or health system that gives patients access to certain data within their EHR. To access their portal, patients create an account and log in using a secure username and password. Many portals offer patients the ability to view information about recent appointments, lab and test results, upcoming appointments, educational information, provider notes, billing details, and discharge instructions. Some portals also enable patients to securely message their physician, request medication refills, and schedule appointments. Additionally, certain portals offer the possibility for patients to schedule and attend an "e-visit," which is comparable to a virtual house call [26, 27]. For minor issues, such as a small wound or rash, patients can get diagnostic and treatment options online, potentially saving a trip to the provider's office [What is a patient portal? | [28]]. The secure two-way communication allows patients to stay connected to their health care team and feel supported between visits, and in some cases, may prevent patients from traveling long distances or missing work for unnecessary in-person visits.

While nearly all hospitals offer patients access to an online portal, adoption and use rates remain quite variable. According to a 2017 Government Accountability Office report, 90% of providers offered patients access to an online portal, but just one-third of patients actually took advantage of this service [29]. Pew Research showed that 7 in 10 US adults say they track at least one health indicator on an online patient portal [30]. Of patients who accessed their online portal in the last year, 8 in 10 considered their online medical record both easy to understand and useful, according to a report from the Office of the National Coordinator (ONC) [31]. Patients' reasons for not accessing their portal were preferring to speak to health care provider directly (76%), not having a need to use the online medical record (59%), concerns about the privacy/security of online medical record (25%), and not having a way to access the website (20%) [31]. Today, patient portals seem to serve as the best alternative to email. Secure portals allow patients and their treatment teams to exchange messages related to their individual care needs. As such, adding new features to patient portals may improve their use and empower patients to actually track their overall health.

Mobile Health Applications

Examples are the following:

1. GetWellLoop (GetWellNetwork, Inc.), Bethesda, MD
2. SeamlessMD (SeamlessMD), Toronto, ON, CA
3. MyMobility (Zimmer Biomet), Warsaw, IN
4. Force (Force Therapeautics), New York City, NY
5. Twistle (Twistle Inc.), Seattle, WA
6. Pattern Health (Pattern Health), Durham, NC
7. Mobomo (Mobomo), Vienna, VA
8. WellBe (WellBe Inc.), Maddison, WI
9. Conversa, tap cloud (TapCloud LLC), Chicago, IL

Mobile applications are software programs that run on smartphones and other mobile communication devices. Unlike a portal that is accessed through a patient's web browser, an application is downloaded onto the patient's mobile device. Mobile health applications can be used in a variety of ways to improve patients' health. With an assortment of features and an emphasis on user-friendly design, many orthopedic patient engagement applications allow for secure two-way messaging, data collection for PROMs, tracking of patients' subjective complaints (e.g., pain, swelling), monitoring of patients' activity (e.g., step counts, sleep cycle), and the exchange of clinical photos. Within the application, patients can often send a message to their care team, view educational videos, get reminders about pre-and post-op instructions, set goals and track their recovery progress, log opioid use and pain symptoms, and view postoperative rehabilitation videos. Some applications allow the transfer of data collected within the application to be shared with an EHR or health portal, which can help inform an array of specialists and improve care continuity.

Given these capabilities, patient engagement applications can aid in the monitoring of patients during the postoperative period in new ways that traditional patient portals were unable to achieve. According to a 2017 study from the University of Pittsburgh School of Health and Rehabilitation Sciences, traits of patient engagement applications that correlate with the greatest patient activation and prolonged use, include the application's ease of use and sign up process, the esthetic appeal and engagement, the level of user education, the inclusion of social support system, and the use of personalized health information (rather than generic education) [32].

Paired to the benefits, there are limitations with mobile applications. For some patients, downloading and navigating a new application may be cumbersome. Most applications require that a patient has a smartphone and some may only be available on certain types of phones/operating systems (e.g., Apple™, Android™). The impact on clinical workflows must also be considered as it relates to enrolling patients and having a means to monitor data and communication generated by the software. Within applications that allow two-way message exchange between patients and providers, the ease of communication may result in patients feeling they have 24/7 access to their provider to ask unlimited questions, which can ultimately strain clinical resources.

Currently, many mHealth™ applications are offered by independent health tech companies and the patient-generated data within the application is not shared or included in the patient's EHR. Since this creates a fragmented data environment, some believe that these applications have to be better connected to the patients' health records in order to be effective and improve patient outcomes [33]. However, there are relevant privacy and legal concerns as it relates to sharing privileged data [34–36]. As such, additional research should focus on the credibility, accuracy, and overall patient benefit of mHealth applications, specifically as stand-alone offerings separate from the EHR, or as applications that are integrated with the EHR.

Chatbots

Examples are as follows:

1. STREAMD (StreaMD Corp.), Chicago, IL
2. Conversa (ConversaHealth), Portland, OR
3. Memora Health (Memora Health), San Francisco, CA

A chatbot is an artificially intelligent software application that users interact with through conversation. Chatbots are designed to simulate human conversations and provide fast, automated answers to questions. Many chatbots function within existing messaging platforms (such as SMS text messaging, Facebook Messenger,™ Whats App™) and do not require users to download a new application. Usually, a bot is designed to automate human-like tasks (such as booking a flight, scheduling a meeting, or depositing money into a bank account). In healthcare, we have seen the introduction of chatbots to handle a variety of tasks including symptom checking, medication adherence, nutritional counseling, and mental health coaching.

Chatbots can be particularly attractive in the orthopedic perioperative period because they deliver timely, educational information and provide patients with immediate access to information and care instructions. While a patient may have to wait hours or days for a provider to respond to a phone call or a message sent through a two-way messaging application or portal, a patient who texts into a chatbot gets an instant answer. This may be especially helpful with patients who have simple questions (e.g. "When can I shower?) that could easily be answered through an automated response, and frees up clinical staff to spend time in more value-added areas or handle more pressing patient concerns (e.g. wound issues,

infections). In most cases, the chatbot content can be customized to the physician and procedure.

SMS-based chatbots are liked by patients because of their accessibility and ease of use. While some patients may not have a computer or smartphone to access a portal or app, text messaging can be delivered to any existing mobile phone and it is increasingly used by people from all socioeconomic classes and age groups, including those above 65 years of age [37]. Patients do not need the latest cell phone software or a data plan in order to send and receive text messages. In fact, studies show that 98% of text messages are read, while only 3% of applications are used after 30 days of downloading, and only 20% of emails are opened [38, 39].

The drawbacks of chatbots include their limited features and potential for inaccuracy. Because chatbots exist within messaging platforms, they may offer fewer features and capabilities compared with portals or applications. Depending on the specific chatbot, patient conversations that take place within the chatbot may not be integrated with the EHR. Above all, the effectiveness of a chatbot relies on its accuracy and ability to provide helpful information. This is largely dependent on its ability to categorize topics of discussion and provide appropriate responses to patient-generated questions. This requires thoughtful design and an extensive database of relevant clinical conversations. The utility of chatbots is particularly enhanced for procedures and protocols that are consistent for all enrolled patients (i.e., large joint replacements, medication reminders, etc.).

Discussion

In an era where orthopedic patients are spending more time outside of the traditional hospital setting, there is a special interest in initiatives and activities that help effectively engage patients to optimize their outcomes and reduce the cost of each care episode. PEPs are playing a growing role in this effort by providing a digital platform that assists in the coordination of care during the perioperative period.

Today, a multitude of PEPs exist and take the form of web-based portals, mobile applications, and chatbots. In general, these platforms can improve patient outcomes, decrease costs, and assist with the collection of patient-reported outcomes. These platforms share many similarities, and choosing a specific one to incorporate into your practice should be based on your particular practice's needs and clinical initiatives. For example, if you are looking to create secure messaging channels with your patients, a HIPAA compliant mobile app may be the best-suited solution. If you are looking to limit resource utilization and create automated patient-facing pathways, an SMS chatbot may be a great option.

Before introducing a PEP into your practice, know what you are hoping to gain and be sure to do your due diligence. Look for platforms that have evidence to support their claims. Make sure all regulatory requirements (HIPAA, FDA, etc.) have been met. Ask about the company's short- and long-term plans, as many of these platforms are offered by startup companies. Consider your patient population and what they would be comfortable using. How many of your patients will you be able to reach? Is the platform limited to certain mobile operating systems?

Perhaps one of the most important factors to consider is how it will impact your existing workflows. What kind of time and staff resources are required to implement and manage the platform? Are patients enrolled automatically, will someone on your staff have to enroll each patient, or do patients enroll themselves? Also, consider the degree to which you can customize the content of the platform. Can it be customized to you and your preferences? How easily can changes be made if you change your patient instructions? Know whether the software integrates with your EHR or practice management software.

In regard to cost, pricing is highly variable among different platforms. Some are billed on a per-patient or per-message basis, while others are billed as a monthly or annual subscription that supports unlimited patient enrollments and messages. Consider the length of the contract as well. If you are not satisfied, how easily can you end the service? Further, in an era of cost containment and overhead reduction, it is important to determine if such patient communication or "remote touches" can be reimbursed, included in the episode cost or potentially shared amongst all parties (as there are potential benefits to providers, insurance companies and patients).

Future Directions

The future will continue to bring many new digital opportunities and refine the ones we are currently using. Automated communication will be the next phase of efficiency in regard to patient communication, engagement, and clinical resource utilization. We will see integration of the stand-alone PEPs into the EHR and further integration of wearable devices (e.g. pedometers, pulse oximeter, blood pressure monitors) and have better data as to the value that monitoring these metrics brings to our clinical treatment algorithms. We will continue to identify what objective and subjective patient-generated data is associated with improved patient outcomes, and we will refine our data collection efforts based on these findings. Ultimately, it will be the simplest and most efficient solution that is supported by high-quality clinical data that will stand the test of time and be the best fit for our patients and treatment teams.

Conclusion

Patient engagement is key to improving orthopedic outcomes, reducing cost, and enhancing patient satisfaction. The ubiquity of mobile devices can be leveraged to positively engage our patients. There are multiple PEPs available and take the form of patient portals, mobile health applications, and chatbots. Surgeons and health systems should carefully evaluate patient engagement platforms to suit their needs.

Compliance with Ethical Standards

Conflict of Interest Kevin Campbell, MD, and Philip Louie, MD, own stock in STREAMD, an orthopedic patient engagement company.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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