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Editorial

The Advent of Smartphone Applications in Spine Surgery: Bringing the Field to the 21st Century

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See the article "Smartphone-Based Self-Assessment of Objective Functional Impairment (6-Minute Walking Test) in Patients Undergoing Epidural Steroid Injection" via https://doi.org/10.14245/ns.2040022.011.

In this day and age, smartphones are ubiquitous and indispensable in our daily lives, allowing us to perform complex tasks at a push of a screen. Smartphones and applications (apps) have revolutionized the way that we interact with each other and the world around us. The field of medicine has been slow to adopt the technology and utilize it to its full potential, especially in spine surgery. By leveraging the technology, spine surgeons can advance clinical practices, optimize efficiency, and improve quality and safety processes.

There are only a few published studies in the literature on the use of smartphone apps in spine surgery. A preliminary study looking at the interest of patients with smartphone apps in spine surgery showed that a high percentage of patients used a smartphone (70%) and 81% of these patients were interested in using a smartphone app for postoperative monitoring and communication.[1] Stewart et al.[2] demonstrated that the use of a smartphone app improved patient compliance with perioperative instructions and reduced last-minute surgery cancellations, likely due to improved patient communication and perioperative patient education. The remaining few studies in the literature relate to the use of smartphone apps to measure radiographic measurements such as Cobb angles and sagittal parameters in adult spinal deformity.[3-6]

In our institution, the electronic medical record (EMR) can be accessed by a smartphone app, initially with limited capabilities that improve with each update. At first, the capabilities were read only. The surgeon can read the patient's chart, find the location of the patient in the hospital, see if the patient is in the operating room, and review pertinent labs, tests, and imaging, all through the smartphone app. Data security is of paramount importance with patient health information and with facial and thumbprint recognition technology, the chart can be unlocked securely within seconds. As the technology matures, clinical notes and orders can also be completed through the app, making the EMR fully functional through the smartphone. This functionality allows physicians to work from any location in the world with internet connection, instead of being tied to the hospital terminal or logging in remotely from a home computer. Clinical information is literally at your fingertips, which can improve patient care, reduce medical errors and mistakes, and allow us to be more efficient with our time.

The smartphone app can also improve communication with our patients in a secure, HIPAA (Health Insurance Portability and Accountability Act)-compliant manner. We can securely message our patients about test results, imaging findings, and surgical plans, which can save time from a clinic appointment. Patients can send pictures of their wounds and describe any postoperative symptoms. In our institution, we developed a smartphone app that regularly collects patient-reported data postoperatively, including visual analogue scale score, distance walked, status of the incision including pictures, as well as patient-reported

outcome measures (PROMs). Patients download the app on their smartphone and they are prompted by the app to answer questions selected by their surgeon through smartphone notifications on a regular basis. The data is then sent securely to the surgeon through the EMR for analysis with alerts on abnormal responses. This app allows for direct communication with the patient and physician about the postoperative course, which may lead to early intervention for any complication that may arise. With early detection and intervention, we can reduce unnecessary emergency room visits, readmissions to the hospital and reoperations, and ultimately reduce skyrocketing health care expenditures. Patient satisfaction is high since they are directly connected to their physician while taking an active role in their own health care. We are in the process of determining the clinical effectiveness of the smartphone app in improving the quality and safety of spine surgery.

For research purposes, smartphone app technology can facilitate data collection as there is the difficult challenge of obtaining PROMs postoperatively through conventional methods of postal mail or even online. Convenience can be the differentiating factor in compliance and the smartphone app can aid in this. The subject would receive a notification email with a link to the app, quickly access the app through facial or thumbprint recognition, respond to the PROMs, and press submit, all in the manner of minutes. This process would obviate the need for mailing a paper survey to the researcher, or even logging into a website after forgetting the password due to the plethora of passwords that we are all required to constantly update and remember in our daily lives. In addition, researchers can utilize smartwatch technology that pairs with smartphone apps to obtain health-related data such as heart rate, walking distance, steps taken, stairs climbed, and calories expended that could be used for research purposes. In the article entitled, "Smartphone-based self-assessment of objective functional impairment (6-minute walking test) in patients undergoing epidural steroid injection," the authors utilize a smartphone app to obtain objective data on the functional status of subjects undergoing lumbar epidural steroid injections.[7] Subjects performed the 6-minute walking test, which was previously shown to be highly reliable test,[8] at regular intervals before and after the injection with correlation of clinical improvements, increased walking distance and PROMs. This paper demonstrated that patient self-reported data in spine procedures can be effectively obtained with smartphone app technology.

By leveraging the technology that is designed to make processes faster and efficient in our daily lives, we can improve the care delivered to our patients. Clinical information is more accessible than ever with this technology, allowing surgeons to be better informed and make better decisions. We can securely and quickly communicate with our patients and provide higher quality care by doing so. The future is already happening all around us and we, as spine surgeons, should progress with it.

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Title: Guernica
Artist: Pablo Picasso
Year: 1937
Guernica was Picasso's response to the bombing of the Basque town of the same name on April 26, 1937 during the Spanish Civil War. Picasso was commissioned by the republican government of Spain to produce a mural painting for the Spanish Pavilion at the World Fair in Paris. Painted in one month - from May to June 1937 - *Guernica* became the centerpiece of the Spanish pavilion and a sensation at the Fair, but it was consequently banned from exhibition in Spain until military dictator Franco fell from power in 1975.
More information: https://www.wikiart.org/en/pablo-picasso/guernica-1937