Peer-to-Peer Collaboration Adds Value for Surgical Colleagues

Ameer M. Elbuluk, MD · Michael P. Ast, MD · Jeffrey D. Stimac, MD · Trevor R. Banka, MD ·
Matthew P. Abdel, MD · Jonathan M. Vigdorchik, MD

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Abstract *Background:* Peer-to-peer advisory among colleagues in orthopedic surgery is commonplace in academic medical centers. In the private practice setting, however, it becomes more difficult for surgeons to discuss complex cases among peers. *Purpose/Questions:* We sought to study the effect of peer-to-peer mentorship on surgeons' decision-making and on patient care across academic and private adult joint reconstruction practices via the use of group secured messages. *Methods:* From 2013 to 2016, we established a messaging system that was compliant with the Health Insurance Portability and Accountability Act (HIPAA) among five previous adult hip and knee reconstruction co-fellows in order to discuss complex cases. Data collected from each case included patient demographics (age and sex), history and physical examination, relevant imaging in orthogonal planes, and preliminary diagnosis and treatment plans. Data collected from group responses included nature of additional inquiries, literature citations,

operative recommendations, and sample imaging of similar cases previously treated. *Results:* The group consisted of two private practice surgeons and three academic surgeons. Data was collected on 283 cases discussed during the study period. None of the patients had any HIPAA violations. The mean number of reviewers who commented on a case was 2.4, with at least one response in 97% of cases. In 33% of the cases, the peers confirmed the initial treatment plan, and in 67% of the cases, an alternative treatment plan was recommended and executed. The case distribution was 94 primary and 189 revision procedures, including 173 hips, 103 knees, three ankles, two shoulders, and two pelvises. *Conclusion:* In the majority of cases exchanged between young surgeons via a group messaging system, a significant impact on patient care was appreciated. In a technology-driven era, peer-to-peer advisory for difficult cases via a rapid feedback method may allow for substantial improvement in patient care, particularly for surgeons not practicing at a large academic medical center with access to several partners and multiple opinions.

A. M. Elbuluk, MD
Hospital for Special Surgery,
New York, NY 10021, USA

M. P. Ast, MD
Mercer-Bucks Orthopaedics,
Lawrenceville, NJ 08648, USA

J. D. Stimac, MD
Norton Orthopedic Associates,
Louisville, KY 40214, USA

T. R. Banka, MD
Henry Ford Medical Center,
Dearborn, MI 48216, USA

M. P. Abdel, MD
Department of Orthopedic Surgery, Mayo Clinic,
Rochester, MN 55905, USA

J. M. Vigdorchik, MD (✉)
Department of Orthopedic Surgery, NYU Langone Orthopedic Hospital,
New York, NY 10003, USA
e-mail: jonathan.vigdorchik@nyumc.org

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Introduction

As the USA continues to address rising healthcare costs, elective procedures such as total joint arthroplasty (TJA) have come under close scrutiny [12, 13]. Under the Affordable Care Act (ACA), the creation of alternative payment models has helped to improve care delivery, increase the value and quality of healthcare, and decrease the financial burden on the healthcare system [3, 9]. However, these innovative payment models typically help to address expenditures only *after* the patient has already undergone surgery. In order to truly increase the value of care, it is important to evaluate each item in the care delivery chain, including prevention, diagnosis, treatment, and whether certain patients should even undergo surgery. To address these

challenges, peer consultation and expert advice continue to serve as a reliable healthcare platform to help with these decisions, which often dictate the allocation of scarce resources [5, 14, 15].

Although telemedicine has proven its benefit in other sectors of healthcare delivery, few studies have described its usefulness in orthopedic surgery, particularly TJA [2, 4, 17]. Despite the overarching goal of cost reduction, it must never compromise the quality and safety of patient care. Academic medical centers have long established opportunities to discuss complex cases among surgeons. However, private and community practitioners often do not share this privilege. Furthermore, the need for peer-to-peer communication may be most important for those surgeons just beginning their orthopedic practice after extended training. Ultimately, increased communication and expert opinion (i.e., level-5 evidence) are important to aligning goals and providing optimal care.

In this study, we describe our experience with a secure messaging system that was established for peer-to-peer collaboration for adult reconstruction surgeons to discuss their cases. Our hypotheses were that (1) more than 50% of cases would discuss revision procedures, with total hip arthroplasty (THA) accounting for more than 50% of cases; (2) less than 50% of participants would respond when advice was solicited; (3) treatment protocols would be altered in less than 25% of cases; and (4) none of the cases would reveal personal health information (PHI) on the secure application. The objectives of our pilot study were to (1) determine if the implementation of an alternative messaging platform could impact the decision-making process for TJA surgeons; (2) successfully remain compliant with the Health Insurance Portability and Accountability Act (HIPAA); and (3) increase clinical communication that could improve the management of orthopedic patients.

Materials and Methods

Five currently practicing orthopedic surgeons finished their adult reconstruction fellowships in 2013 and kept in touch regularly: two surgeons went on to private practice and three remained at academic medical centers. These five surgeons practice in diverse regions of the USA. Of the three academic surgeons, two practice at high-volume, tertiary care academic centers in the upper Midwest, and the other practices at a large urban academic medical center in the Northeast. One of the private surgeons also practices in the Northeast and the other in the South. In addition to performing elective TJA, all surgeons take primary orthopedic trauma call at their respective institutions. The mean volume of cases per surgeon is approximately 350 per year (range, 300 to 400). Among these surgeons, the distribution by procedure type is 65% primary and 35% revision cases (Tables 1 and 2).

From 2013 to 2016, a pilot study was completed to evaluate the integration of a HIPAA-compliant messaging system (pMD[®], San Francisco, CA, USA) among these surgeons in order to discuss complex cases, improve information sharing, and determine its practicality in

Table 1 Demographics of included patients

Variable	Total (%)
Total	283 (100)
Mean age (years)	63.6
Gender	
Male	127 (45)
Female	156 (55)
Procedure	
Primary	94 (33)
Revision	189 (67)
Anatomic location	
Hip	173 (61)
Knee	103 (36)
Ankle	3 (1)
Shoulder	2 (1)
Pelvis	2 (1)

orthopedic surgery. pMD provides secure messaging among healthcare teams by allowing colleagues to send and receive text, photo, video attachments, which are all encrypted, keeping patient information secure. The interface also allows users to send reminders notifying recipients if messages are not read after a set period.

Over the course of the study, each surgeon identified challenging surgical cases and consulted the other four surgeons to solicit their input. All surgeons attempted not to transmit any PHI on the software application. In order to uphold the standard of care in management of orthopedic injuries, detailed information on the following topics was discussed for each case:

- (1) Patient demographics (age and sex)
- (2) History and physical exam: range of motion, pain level, functional scores
- (3) Imaging: review of magnetic resonance imaging, X-ray, computed tomography results
- (4) Preliminary diagnosis
- (5) Treatment: operative versus non-operative management
- (6) Surgical procedure options: approaches, prosthetic options, postoperative rehabilitation, etc.
- (7) Known literature, include specific articles

Following each case presentation, surgeons asked for additional information, cited recent literature, or provided imaging and surgical recommendations from similar cases that they have seen or treated. At the end of the study period, the secure messaging system was reviewed to document potential HIPAA violations, number of cases, and respondents per case. We analyzed how often initial treatment plans were changed and whether there was overall consensus among surgeons for each case. Finally, the surgeons were polled on their satisfaction and feasibility of using the pilot program. Mean follow-up was 2 years.

Statistical Analysis

All statistics for this investigation were analyzed using a standard computer program (Microsoft Excel). The data from the messaging system was tabulated and outcome

Table 2 Literature review of new communication methods between clinicians

Study	Population	Intervention	Outcome
Daruwalla 2014 [6]	Orthopedics	MyDoc	92% agreed that MyDoc should replace current systems of peer-to-peer communication in the hospital
Przybylo 2014 [16]	Internal medicine	Medigram	Compared to paging, rated significantly ($p < 0.05$) more effective in allowing users to communicate thoughts clearly, efficiently and in integrating into workflow
Joseph 2013 [11]	Trauma	Smartphones vs. pagers	94% of respondents in favor of having wireless means of communication at a level 1 trauma center
Wu 2011 [21]	Internal medicine	Smartphones vs. pagers	Perceived improvement in efficiency over the use of pagers for clinical communication
Wu 2010 [19]	Internal medicine	Smartphones	Residents strongly preferred the smartphones over conventional paging with perceived improvements in efficiency and communication
Wu 2015 [20]	Internal medicine	Secure messaging application	67.1% of the trainees and 73.2% of nurses strongly agreed that the mobile system made them more accountable in their clinical roles

measures were calculated from these figures. Results were reported as either a percentage of total cases, mean, or range values, depending on the variable.

Results

Following a thorough review of the messaging portal, 283 cases were discussed over the 3-year study period. Four of the five surgeons contributed the majority of cases (98%) for discussion in the secure system. The case presenter breakdown was as follows: reviewer 1 (24%), reviewer 2 (20%), reviewer 3 (2%), reviewer 4 (22%), and reviewer 5 (32%). The distribution of cases was classified by stage and location of surgery. Ninety-four cases (33%) were regarding primary procedures and 189 cases (67%) discussed revision cases. Upon initial presentation, imaging was provided in 44% of cases. In terms of surgical site, 173 hip (61%), 103 knee (36%), three ankle (1%), two shoulder (1%), and two pelvis (1%) cases were discussed. For each presented case, there was at least one response in 97% of all cases. The mean number of reviewers to comment on a single case was 2.4 (range, 0–5).

Breakdown of reviewer comments revealed that surgical technique (59%) was most often discussed, followed by further patient inquiries (45%), cited literature (12%), new technology or techniques (7%), and orthopedic board-related topics (6%).

In 33% of presented cases, the other surgeons confirmed the initial treatment plan. In comparison, an alternative treatment plan was recommended and executed in 67% of cases (Fig. 1). Overall, a majority consensus was achieved in 73% of all cases.

During all 283 case discussions regarding PHI, there were no HIPAA violations, confidential information, or sensitive messages exchanged that could compromise personal data. There were no malpractice litigations among all cases.

At the completion of the study, all surgeons provided positive feedback toward this initiative and said that the secure system exceeded expectations. Surgeons were also asked questions on the most beneficial aspects of the portal. Qualitative benefits included feeling more supported in surgical decisions, easier facilitation of patient care, increased professional development and mutual learning, greater diversity of thought, and a safe and effective environment for collaboration.

Fig. 1. Recommendations on presenter's initial plan.

Discussion

Our study showed the effectiveness of mobile peer collaboration among young orthopedic surgeons in the clinical setting. Our findings suggest that revision and THA cases were the most common categories (more than 50%) in which young surgeons asked for guidance and advice. That our mobile application remained HIPAA-compliant also supports the development of newer, safe communication systems to increase efficiency and quality of care. The study found that in 67% of cases, alternative treatment plans were discussed and executed, which helps to support the provision of excellent patient care and decision making. Our findings highlight how peer-to-peer mentorship can be one of the greatest assets to young physicians.

Peer-to-peer mentorship has long been recognized in clinical education as a positive tool that can enhance clinical, teaching, and decision-making skills [1, 7, 10]. The organizational structure of medical residency and fellowship fosters active learning from peers and provides countless opportunities to learn and collaborate with one another. However, as physicians graduate from these programs, they undoubtedly face several challenges. Aside from the many difficulties of building a practice, one of the toughest tasks for young physicians is making the right decisions. Although some surgeons remain in an academic setting, most move on to a rural practice, a small community program, or a non-teaching hospital, where they are not surrounded by the experienced surgeons, they learned from during residency and fellowship. For the first time, they do not have mentors, friends, and colleagues to ask for counsel and advice. This transition from fellowship training to employment can bring undue stress, anxiety, and responsibility.

With mobile health applications so prevalent, our group of co-fellows wanted to establish a formalized electronic system to continue sharing the mutual benefits of our peer-to-peer mentorship. During our fellowship, we recognized the importance and value that peer-learning had on our educational growth and that it should continue to be an integral part of our early professional career. Rather than making isolated decisions or simply referring complex cases, we believed that the secure messaging system would not only improve our decision-making skills, but also increase our orthopedic knowledge. The messaging portal provided a daily opportunity to discuss surgical indications, recent literature, and techniques that inevitably had a positive impact on patient care. Many young surgeons may choose to either refer cases or take on complex operations alone, which can lead to unexpected complications and affect their future desire to take on such cases. Residents and fellows spend years building strong relationships with one another, only to potentially lose that positive experience in practice. Furthermore, studies have shown that peer-to-peer learning can not only lead to decreased stress when compared to learning from clinical instructors but also provides increased confidence in clinical skills and decision making [7, 8, 18].

New surgeons can find it difficult to meet the demands of building a practice while ensuring excellent operative

results. Our study provides evidence to support that peer-learning platforms integrated into early clinical practice for orthopedic surgeons may strengthen their confidence in surgical decision making. The integration of this application in an orthopedic setting has the potential to improve clinical outcomes, surgeons' surgical acumen and ability to follow clinical guidelines, and patient satisfaction.

Compliance with Ethical Standards

Conflict of Interest: Ameer M. Elbuluk, MD, Michael P. Ast, MD, Jeffrey D. Stimac, MD, Trevor R. Banka, MD, Matthew P. Abdel, MD, and Jonathan M. Vigdorchik, MD, declare that they have no conflicts of interest.

Human/Animal Rights: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013.

Informed Consent: Informed consent was waived from all patients for being included in this study.

Required Author Forms Disclosure forms provided by the authors are available with the online version of this article.

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