OPEN

PRS GLOBAL OPEN

ORIGINAL ARTICLE
Hand

Improving Perioperative Preparation for Patients Undergoing Surgical Treatment for Distal Radius Fractures

Jacqueline N. Byrd, MD, MPH, MS*†
Kristine A. Huynh, MD*‡
Hoyune E. Cho, MD, MS*§
Kevin C. Chung, MD, MS*†

Background: We aimed to review common patient concerns after surgical repair of distal radius fracture (DRF) to identify potential interventions to improve the gap between expectation and education for DRF patients.
Methods: We conducted a retrospective cohort study of 100 consecutive patients who underwent surgical repair of DRF at a level I trauma center. Patient-initiated communication notes were reviewed with thematic analysis to identify the common reasons patients required additional information. We used the Patient Education Materials Assessment Tool to score the available educational resources for DRF patients for the understandability and actionability of the educational materials provided to the patients.
Results: Of 165 patient communication episodes, 88.5% occurred postoperatively. The most common concerns were pain (30, 15.4%) and surgical site changes (24, 12.3%). Most communications (171, 83.4%) were resolved with patient education through instruction or reassurance. The reviewed materials did not address pain or surgical site changes. No reviewed materials provided actionable steps patients could take to facilitate recovery.
Conclusions: Pain management and normal wound healing were the most common surgical concerns of DRF patients. We identify opportunities to improve expectation-setting in online materials and during face-to-face education to create a more patient-centered perioperative experience. *(Plast Reconstr Surg Glob Open 2023; 11:e4995; doi: 10.1097/GOX.0000000000004995; Published online 19 May 2023.)*

INTRODUCTION

Over half of adults in the United States use the internet for health information, but without any standards, web-based health literature are often unreliable, inappropriate, and not at the recommended reading level for the general public.[1–7] Among patients using the internet for health information, over half do not discuss findings with their provider.[7] Therefore, providers must offer reliable resources and teach patients to consider quality and accuracy when using online health literature to supplement their clinical encounter. Patient understanding of health-related information can directly affect patient satisfaction, healthcare outcomes, and subsequent health service utilization.[8] For example, previous studies demonstrated that gaps between provider education and patient understanding led to increased usage of emergency services and more frequent inpatient hospital admissions.[9,10] Additionally, patients reported limited understanding of their diagnoses and medication regimen after discharge.[11,12] Inadequate perioperative education can result in unnecessary use of healthcare services, redundant volume of care, and associated costs.[13–16]

Patients who underwent orthopedic procedures received less information than they expected, leading to lower patient satisfaction.[17] In comparison, high-quality patient education empowers patients to feel

*From the *Section of Plastic Surgery, Department of Surgery, University of Michigan Medical School, Ann Arbor, Mich.; †Department of Surgery, University of Texas Southwestern Medical School, Dallas, Tex.; and ‡Department of Plastic Surgery, University of Texas Southwestern Medical School, Dallas, Tex.; and §Department of Plastic Surgery, University of California, Irvine, School of Medicine, Orange, Calif.*

Received for publication January 25, 2023; accepted March 23, 2023.

Drs. Byrd, Huynh, and Chung contributed equally to this work.

DOI: 10.1097/GOX.0000000000004995

Disclosure statements are at the end of this article, following the correspondence information.

more prepared for surgery and postoperative recovery, which improves the overall experience.[14,18,19] However, procedures with short perioperative stays have inherently limited opportunities available for physicians and nurses to provide patient instructions and psychological preparation. It is important to optimize this in-person preparation of the patient and family, as it facilitates expectation-setting regarding function, pain, and healing. Patients who are better informed and equipped with robust coping mechanisms have less acute postoperative pain, use fewer analgesics, and recover faster.[20–22] The most common upper extremity fracture, distal radius fracture (DRF) is managed during a relatively brief outpatient surgical encounter.[23,24] This limits opportunity for repeat in-person patient education, discussion of concerns, and development of healthy patient coping strategies.

In this study, we investigated patient inquiries generated in the perioperative period for patients undergoing operative treatment for DRF. Additionally, we examined the quality of online patient education materials, as these resources are used to supplement education during surgical consent and utilized postoperatively by patients.[25,26] Results of this study can identify current opportunities to improve perioperative patient preparation among all members of the patient care team.

Takeaways

Question: What are the most common patient concerns after distal radius fracture and how are they addressed in existing professional society patient-facing educational resources?

Findings: This retrospective review of patient-initiated communication after operative repair found that pain management and normal wound healing were the most common postoperative concerns. However, expectations for postoperative pain or wound appearance were not addressed in materials provided by either professional society reviewed.

Meaning: Surgeons discussing operative repair of distal radius fracture should prioritize expectation-setting and revise existing supplemental materials to address common concerns and maximize actionability.

METHODS

Patient Cohort

We reviewed surgical records starting from December 2018 to September 2019 at a level 1 trauma center and included 100 consecutive cases of operative repair of DRF (Current Procedural Terminology codes 25606, 25607, 25608, 25609, 25671, and 25676). We excluded patients younger than 18 years at the time of surgery, patients with a prolonged length of stay (≥ 24 hours), patients undergoing multiple surgical procedures (eg, polytrauma), and non-English-speaking patients. All documentation before and after surgery was reviewed for patient-initiated communication, defined as virtual or phone communication initiated by or on behalf of the patient. This study was approved as exempt by the institutional review board. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines and the SQUIRE 2.0 guidelines for quality improvement.[27–29]

Qualitative Data Collection and Analysis

Two authors (K.A.H. and J.N.B.) reviewed electronic medical records to identify patient-generated communications, defined as telephone encounters and patient portal messages initiated by the patient during the perioperative period. Clinic support staff documented telephone calls in a standardized format to ensure accuracy, and the responses to portal messages were included in this review. We defined the perioperative period as from the time of initial presentation to our tertiary center until 90 days after surgery. We abstracted the date of presentation, date of surgery, subject(s) of inquiry, and encounter resolution(s) from each patient record. Some calls covered multiple questions and were resolved through one or more methods. We included all inquiry themes and all resolution categories relevant to the call. Total counts for concern and resolution themes represent the multiple issues and resolutions per communication. We summarized patient demographics using Stata 16 (StataCorp, College Station, Tex.). We report mean and standard deviation for continuous data and counts for categorical data. We used the chi-squared test and logistic regression to test association between patient variables and calls.

Evaluation of Patient Education Materials

We used the Agency For Healthcare Research And Quality Patient Education Materials Assessment Tool (PEMAT) to assess the quality of the publicly available online information. We applied it to the current "wrist fracture" or "distal radius fracture" information published by our institution and two professional societies, the American Society for Surgery of the Hand (ASSH) and the American Academy of Orthopaedic Surgeons (AAOS). The PEMAT offers two scoring algorithms for printed and audiovisual materials. The PEMAT is a validated tool for systematic evaluation and comparison of patient education literature by both patients and health professionals.[30] We reviewed printable web resources using the PEMAT-P (print) scoring algorithm. The PEMAT-P score consists of 19 understandability parameters and seven actionability parameters. These parameters are to be considered from the patient perspective.[31] In other words, a written resource is understandable if it is clear and focused enough that patients with a range of health literacy could repeat the material after reading it. It is actionable if it enables those patients to take concrete steps. For instance, a resource that directs a patient on wound care step-by-step is actionable. A resource with a brief comment that wound care might be needed is not actionable. The materials for this study were scored

by J.N.B and K.A.H. Any discrepancies between the two investigators were discussed to reach consensus, and coding examples were reviewed to ensure consistency. The scoring authors also considered the patient concern themes and took note of which were not addressed in existing materials.

RESULTS

Study Cohort Characteristics

An estimated 100 operative DRF patient-cases were included. Most patients were women (78%) and White (83%), with mean age of 55±17 years (Table 1). There were 165 communication episodes from 74 unique patients. There was no difference in calls by gender (P = 0.996), with female patients accounting for 77% of encounters with and without patient-initiated communication episodes. There was no relationship between age and likelihood of initiating communication (OR 0.97; 95% CI 0.95–1.0). Most (88.5%) of the patient-initiated communication occurred postoperatively (Table 2). The average time to call was 22.4 days (SD 25.7), and call times range from 15 days preoperatively to 90 days postoperatively. Twenty-six patients did not call or send a patient portal message over their follow-up course.

Table 1. Patient Demographics

Patient Demographics	N (Total = 100)
Gender	
Women	78
Men	22
Race	
White	89
Black	2
Asian	5
American Indian or Alaskan Native	1
Unknown	3
Age (y), mean (SD)	55 (17)
Distance (miles), median (IQR)	12 (7–24)

Table 2. Call Characteristics

Calls	N (Total = 165)
Preoperative	19 (12%)
Postoperative	146 (88%)

Thematic Analysis

Within the 165 communication encounters, there were 195 questions and 205 resolutions (Tables 3 and 4). The total number of communications ranged from zero to nine per patient. We coded calls into 10 major reason themes and five major resolution themes, shown in Tables 3 and 4. In total, 60% of concerns were clinical, and 40% were administrative. The most frequent concern was a need to reschedule due to winter weather (26 for occupational therapy appointments and 24 for hand surgery clinic appointments). This was followed closely by pain concerns. Patients called with pain (n = 30), often shortly after the regional block wore off. Clinic staff and on-call providers documented successful review of pain management recommendations with these patients. Surgical site concerns were the most common major theme after pain; common inquiries consisted of sensory changes, swelling, or wound care. This was followed by medication questions with opioids being the most common topic. Calls for refills were captured and represented very few inquiries (Table 3). If a patient called about pain and requested a refill, both codes were applied to that call. However, this only indicates a refill was requested; it does not indicate that the medication was refilled.

Most resolutions (171, 83.4%) included answering questions, patient instruction, or reassurance (Table 4). Three patients were advised to present to the emergency department for evaluation based on their concerns. Two patients were advised of this for pain. One of them went to an outside urgent care facility where the patient received a one-time dose of pain medication with approval of the surgeon. The other received an opioid refill from a primary care provider. This refill was captured in our analysis. The third patient underwent imaging in the emergency department for a surgical site concern without acute findings. Eight patients did not receive or could not fill a postoperative pain medication prescription after same-day discharge. These resolutions were not categorized as refills, but as new opioid prescriptions, as these were replacing unfilled prescriptions.

Patient Education Materials Assessment

There are two institution-specific websites available to patients with DRFs.[32,33] In addition, two resources titled "Wrist Fracture" by the ASSH[34] and "Distal Radius Fracture (Broken Wrist)" by the AAOS[35] are made publicly available

Table 3. Thematic Analysis of Patient Inquiries (N = 195)

	Reason for Call	N	(%)
Medical/surgical	Pain: experiencing pain pre- or postoperatively	30	(15)
	Surgical site: visual or sensation changes	24	(12)
	Medication inquiry: refill request, dosing inquiry, or over-the-counter recommendations	19	(10)
	Other medical concerns: medical questions about issues other than injury or operation	14	(7)
	Activity restrictions: confirming timing of restrictions or specific activity questions	13	(7)
	Occupational therapy progress inquiry: duration of therapy	11	(6)
	Cast fit: questions on expected feeling of cast or need for adjustment	6	(3)
Administrative	Rescheduling: follow-up appointments	50	(26)
	Paperwork: requests for forms to be completed	24	(12)
	Insurance question: coverage or costs	4	(2)

Table 4. Analysis of Communication Resolutions (N = 205)

Resolution	N	%
Discussion with patient		
Patient instructed or reassured	134	65.4
Questions answered (yes/no)	37	18
Medication counseling: answers to specific questions about dosing, refills, or over-the-counter recommendations	19	9.3
Paperwork completed: when requested for insurance or employers	7	3.4
Further work-up ordered: additional imaging or laboratories	5	2.4
Advised to proceed to the emergency department	3	1.5

to patients. We reviewed and scored all four resources using PEMAT and found the understandability scores were higher than the actionability scores in all materials (Table 5). However, the AAOS and ASSH materials were more understandable than our institution's resources. The AAOS and ASSH materials included diagrams of fractures and fixation methods, though no images were included in either of the institution's online materials. Though not a component of PEMAT, graders also documented gaps in the materials relating to the identified patient concern themes.

DISCUSSION

In this study, we evaluated perioperative patient-generated inquiries to identify common patient concerns amenable to intervention. In addition to identifying opportunities to improve existing preoperative and postoperative discussions, we sought to identify opportunities to utilize web-based resources from our institution and professional societies to further improve the patient-centered surgical experience. Sixty percent of these concerns were clinical and are the focus of potential perioperative expectation-setting discussions. Occupational and physical therapy services were the most frequent theme of patient-generated communications; these inquiries were related to scheduling and postoperative activity. Scheduling requests were likely overrepresented by the winter weather during the period studied. These call topics were addressed by clinic staff during normal clinic hours. Pain management and surgical site changes were the most common patient concerns identified. Surgical site concerns resulted from misunderstanding or incomplete understanding of the normal wound healing process. Most questions were documented as resolved with patient re-education; six required interventions, such as clinic evaluation, emergency services, or unplanned imaging. As concern for infection or extreme pain can cause significant patient distress, reassurance and re-education were the most common resolution methods. These interventions empowered patients to adjust to postsurgical changes.

We reviewed existing online educational materials available to patients to supplement their care teams' current in-person perioperative education. We observed inconsistent understandability and low actionability scores across these materials. We identified a need to clarify the language of institutional materials, as the societies' materials were more understandable. Most strikingly, when we considered the most common patient concerns, we observed that the reviewed materials were insufficient in addressing them. For example, they did not address postoperative pain management, expected surgical site changes, or signs warranting further evaluation at an urgent care or emergency department. Our findings support a focus on expectation-setting during in-person and virtual encounters as well as published patient resources.

Setting appropriate perioperative pain expectations in hand surgery is a key element of patient counseling.[36–38] The setting and time constraints of DRF presentation and repair require a provider provide a concise and effective overview of recovery expectations. Beyond the requirements of informed consent, providers should consider the common postoperative questions they receive and address those early in the preoperative encounter. Potential hinderances to information uptake during postoperative education can be attributed to anesthetic effect in the immediate postoperative period. Therefore, it is essential that providers also speak with caregivers who will be responsible for the patients' postoperative care. Postoperative pain concerns were often resolved through reassurance and repeated education, stressing the need for realistic pain management expectation-setting in perioperative discussions. We do not expect to eliminate all phone calls related to pain, as it can be an indicator of a complication and should be evaluated if uncontrolled. However, improved expectation-setting could decrease the number of after-hours calls fielded by on-call surgeons that do not require intervention. Many patient-initiated clinic calls came shortly after routine postblock calls made by anesthesiology providers, suggesting the postblock call is a unique interdisciplinary opportunity to re-emphasize high-yield topics such as over-the-counter pain control recommendations.

Table 5. PEMAT Scoring of Available Patient Education Materials

	Understandability Score (%)	Actionability Score (%)
Institutional		
Fracture malunion (orthopedics center)	64	40
Fracture malunion (musculoskeletal center)	55	40
American Society for Surgery of the Hand		
Wrist fracture	80	40
American Academy of Orthopaedic Surgeons		
Distal radius fractures (broken wrist)	93	20

Perioperative preparation is multifactorial. Psychosocial factors play an important role in management of pain, anxiety, and perceived outcome. Preparation through cognitive-behavioral coping strategies can potentially reduce anxiety and improve distress surrounding surgery. Previous studies have demonstrated that cognitive-behavioral approaches are effective in managing acute postsurgical pain,[39] reducing disability,[40,41] and facilitating earlier return to baseline function.[42,43] In a recent randomized controlled trial of patients undergoing total knee replacement, those patients who received cognitive-behavioral therapy (CBT) preoperatively in-person or via telehealth demonstrated reduced pain scores.[39] Similarly in patients undergoing lumbar spinal fusion surgery, those who participated in preoperative CBT reached independent mobility earlier and used less rescue analgesics.[21] CBT can be a useful perioperative adjunct to facilitate self-management with healthy coping mechanisms.

A recent plastic surgery patient education study discussed the need to improve the delivery of patient education and appropriateness of content for patient-centered care.[44] Our study further highlighted that common intervenable patient concerns regarding surgical site changes and pain are not addressed in existing patient education materials. Adding photographs depicting normal scar healing, wound care, or postoperative changes enhances the utility and understandability of patient education materials. The Agency for Healthcare Research and Quality and the Centers for Disease and Control Prevention use 70%–90% as the threshold for understandable and actionable patient material, but all literature examined in our study exhibited markedly lower actionability scores and only half surpassed the understandability threshold.[30,45] Institutional education materials were directed at patients undergoing surgery, whereas online materials from ASSH and AAOS were largely intended for general education.

The concerns identified in our review further emphasize the need to provide clear and actionable information to provide postoperative patients a sense of control in their recovery. Our data suggest that both the institutional and surgical societies' materials warrant revision to provide actionable steps to empower patients. In addition, the available institutional literature is not specific to DRFs; it should be customized to DRF operative repair and address common patient-identified concerns. Gaps in patient understanding or expectation can be exacerbated when they are not addressed in-person or online. Correcting the education and expectation gaps surrounding pain and recovery will improve the perioperative patient experience.

This study has several limitations. First, our study cohort was based on cases performed at a single large, tertiary academic center with proposed improvements based on existing processes of care. However, such a detailed review of patient communication topics and timing is not feasible in large databases. This academic trauma center experience demonstrates the need for continued focus on patient-centered education in clinical practice and professional organizations' educational resources. The study was designed as a qualitative study to capture the details of these encounters for perioperative intervention planning; it was not designed to investigate associations between patient or surgical characteristics and frequency of communication. Second, grading of patient literature using PEMAT was completed by the authors. Though the graders applied a critical lens to the materials from the perspective of a patient, this approach could generate higher scores than if reviewed by a patient without any medical training. The graders considered these materials after reviewing patient concerns and were also able to assess whether these materials covered frequently asked questions. Third, we did not evaluate current discharge instructions for DRF as there were not DRF-specific instructions provided to patients. The lack of existing patient-centered materials for these patients was one of the motivations behind the study. Similarly, we were unable to assess the quality or quantity of in-person education provided. Although we classify some resolutions as re-education, as documented by the encounter provider, we cannot determine what was repetition and what may have been omitted or misunderstood originally. However, review of these calls facilitates prospective efforts to train providers on concise, but actionable, recommendations for patients and families postoperatively.

Our study identifies several opportunities to improve patient education and expectation-setting in pain management and wound healing. Tailoring education based on common patient concerns maximizes the impact of face-to-face patient education. These findings also provide opportunities at the institutional and specialty society levels to collaborate to enhance the overall care experience by addressing patient-identified needs. Although not captured in this cohort, systemic issues creating language barriers, socioeconomic challenges, and lower health literacy should also be considered when tailoring perioperative discussions. Based on our own institution's review, we propose the following actionable steps to provide patient-centered education:

- Maximize face-to-face perioperative time with patients and families, highlighting expectation-setting based on common pain and recovery questions
- Provide patient education materials that proactively address common postoperative DRF patient concerns
  - Develop multimedia materials for patients to reference:
  - Recommendations for multimodal pain control
  - Photographs of normal and concerning wound changes
  - Augment with telemedicine when appropriate, based on concerns
  - CBT approaches include relaxation therapy, stress management, meditation and coping strategies

Kevin C. Chung, MD, MS
Section of Plastic Surgery
Department of Surgery, Michigan Medicine
2130 Taubman Center, SPC 5340 1500 E.
Medical Center Drive
Ann Arbor, MI 48109-5340
E-mail: kecchung@med.umich.edu

DISCLOSURES

Dr. Byrd is a recipient of a Surgical Scientist Training Grant in Health Services and Translational Research (5 T32 GM 8616-21) from the National Institutes of Health Ruth L. Kirschstein National Research Service Award. Dr. Chung receives funding from the National Institutes of Health, book royalties from Wolters Kluwer and Elsevier, and a research grant from Sonex to study carpal tunnel outcomes. The other authors have no financial interst to declare in relation to the content of this article.

REFERENCES

1. Din HN, Mcdaniels-Davidson C, Nodora J, et al. Profiles of a health information-seeking population and the current digital divide: cross-sectional analysis of the 2015-2016 california health interview survey. *J Med Internet Res.* 2019;21:e11931e11931.
2. D'Alessandro DM, Kingsley P, Johnson-West J. The readability of pediatric patient education materials on the world wide web. *Arch Pediatr Adolesc Med.* 2001;155:807–812.
3. Butler L, Foster NE. Back pain online: a cross-sectional survey of the quality of web-based information on low back pain. *Spine (Phila Pa 1976).* 2003;28:395–401.
4. Morr S, Shanti N, Carrer A, et al. Quality of information concerning cervical disc herniation on the internet. *Spine J.* 2010;10:350–354.
5. Sabharwal S, Badarudeen S, Unes Kunju S. Readability of online patient education materials from the AAOS web site. *Clin Orthop Relat Res.* 2008;466:1245–1250.
6. Polishchuk DL, Hashem J, Sabharwal S. Readability of online patient education materials on adult reconstruction web sites. *J Arthroplasty.* 2012;27:716–719.
7. Diaz JA, Griffith RA, Ng JJ, et al. Patients' use of the internet for medical information. *J Gen Intern Med.* 2002;17:180–185.
8. Berkman N, Sheridan S, Donahue K, et al. Low health literary and health outcomes: an updated systematic review. *Ann Intern Med.* 2011;155:97–107.
9. Cho YI, Lee SYD, Arozullah AM, et al. Effects of health literacy on health status and health service utilization amongst the elderly. *Soc Sci Med.* 2008;66:1809–1816.
10. Griffey RT, Kennedy SK, McGownan L, et al. Is low health literacy associated with increased emergency department utilization and recidivism? *Acad Emerg Med.* 2014;21:1109–1115.
11. Makaryus AN, Friedman EA. Patients' understanding of their treatment plans and diagnosis at discharge. *Mayo Clin Proc.* 2005;80:991–994.
12. Horwitz LI, Moriarty JP, Chen C, et al. Quality of discharge practices and patient understanding at an academic medical center. *JAMA Intern Med.* 2013;173:1715–1722.
13. Gordon EJ, Wolf M. Health literacy skills of kidney transplant recipients. *Prog Transplant.* 2009;19:25–34.
14. Barksdale P, Backer J. Health-related stressors experienced by patients who underwent total knee replacement seven days after being discharged home. *Orthop Nurs.* 2000;24:336–342.
15. Finnegan MA, Shaffer R, Remington A, et al. Emergency department visits following elective total hip and knee replacement surgery: identifying gaps in continuity of care. *J Bone Joint Surg.* 2017;99:1005–1012.
16. Telem DA, Yang J, Altieri M, et al. Rates and risk factors for unplanned emergency department utilization and hospital readmission following bariatric surgery. *Ann Surg.* 2016;263:956–960.
17. Ingadottir B, Johansson Stark A, Leino-Kilpi H, et al. The fulfilment of knowledge expectations during the perioperative period of patients undergoing knee arthroplasty – a Nordic perspective. *J Clin Nurs.* 2014;23:2896–2908.
18. McDonald S, Page MJ, Beringer K, et al. Preoperative education for hip or knee replacement. *Cochrane Database Syst Rev.* 2014;2014:1–2.
19. NIH Consesus Panel. Total knee replacement. *J Bone Joint Surg.* 2010;86A:1328–1335. https://pubmed.ncbi.nlm.nih.gov/15173310/
20. Astin JA. Mind-body therapies for the management of pain. *Clin J Pain.* 2004;20:27–32.
21. Rolving N, Nielsen CV, Christensen FB, et al. Preoperative cognitive-behavioural intervention improves in-hospital mobilisation and analgesic use for lumbar spinal fusion patients. *BMC Musculoskelet Disord.* 2016;17:1–7.
22. Horne DJ, Vatmanidis P, Careri A. Preparing patients for invasive medical and surgical procedures 1: adding behavioral and cognitive interventions. *Behav Med.* 1994;20:5–13.
23. Chung KC, Spilson SV. The frequency and epidemiology of hand and forearm fractures in the United States. *J Hand Surg.* 2001;26:908–915.
24. Eiff M, Hatch R, Calmbach W. Carpal Fractures. In: Saunders, ed. *Fracture Management for Primary Care.* 2nd ed.; 2003.
25. Rhee RL, Von Feldt JM, Schumacher HR, Markel PA. Readability and suitability assessment of patient education materials in rheumatic diseases. *Arthritis Care Res (Hoboken).* 2013;65:1702–1706.
26. Dy CJ, Taylor SA, Patel RM, et al. The effect of search term on the quality and accuracy of online information regarding distal radius fractures. *J Hand Surg.* 2012;37:1881–1887.
27. von Elm E, Altman D, Egger M, et al. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet.* 2007;370:1453–1457.
28. Kelz RR, Schwartz TA, Haut ER. SQUIRE reporting guidelines for quality improvement studies. *JAMA Surg.* 2021;156:579–581.
29. Ogrinc G, Davies L, Goodman D, et al. SQUIRE 2.0 (Standards for Quality Improvement Reporting Excellence): revised publication guidelines from a detailed consensus process. *BMJ Qual Saf.* 2016;25:986–992.
30. Shoemaker SJ, Wolf MS, Brach C. Development of the Patient Education Materials Assessment Tool (PEMAT): a new measure of understandability and actionability for print and audiovisual patient information. *Patient Educ Couns.* 2014;96:395–403.
31. Vishnevetskya J, Walters CB, Tan KS. Interrater reliability of the Patient Education Materials Assessment Tool (PEMAT). Patient Educ Couns. 2018;101:490–496.
32. Michigan Medicine. Surgery O. Fracture mal-union. Available at https://medicine.umich.edu/dept/orthopaedic-surgery/patient-care-services-hand-upper-extremity/fracture-mal-union. Accessed October 1, 2020.
33. Michigan Medicine. Comprehensive Musculoskeletal Center. Malunion fractures. Available at https://www.uofmhealth.org/conditions-treatments/cmc/fracture/malunion. Accessed October 1, 2020.
34. American Society for Surgery of the Hand. Wrist fracture. 2015. Available at https://www.assh.org/handcare/condition/wrist-fracture. Accessed October 1, 2020.
35. American Academy of Orthopaedic Surgeons. Distal radius fracture (broken wrist). 2013. Available at https://orthoinfo.aaos.org/en/diseases–conditions/distal-radius-fractures-broken-wrist/. Accessed October 1, 2020.
36. Alokozai A, Eppler SL, Lu LY, et al. Can patients forecast their postoperative disability and pain? *Clin Orthop Relat Res.* 2019;477:635–643.
37. Morris BJ, Mir HR. The opioid epidemic: impact on orthopaedic surgery. *J Am Acad Orthop Surg.* 2015;23:267–271.
38. Labrum JT, Ilyas AM. Perioperative pain control in upper extremity surgery: prescribing patterns, recent developments, and opioid-sparing treatment strategies. *Hand.* 2019;14:439–444.
39. Buvanendran A, Sremac AC, Merriman PA, et al. Preoperative cognitive-behavioral therapy for reducing pain catastrophizing and improving pain outcomes after total knee replacement: a randomized clinical trial. *Reg Anesth Pain Med.* 2021;46:313–321.

40. Marhold C, Linton SJ, Melin L. A cognitive-behavioral return-to-work program: Effects on pain patients with a history of long-term versus short-term sick leave. *Pain*. 2001;91:155–163.
41. Linton SJ, Andersson T. Can chronic disability be prevented? A randomized trial of a cognitive-behavior intervention and two forms of information for patients with spinal pain. *Spine (Phila Pa 1976)*. 2000;25:2825–31; discussion 2824.
42. Sullivan MJL, Stanish WD. Psychologically based occupational rehabilitation: the pain-disability prevention program. *Clin J Pain*. 2003;19:97–104.
43. Sullivan MJL, Ward LC, Tripp D, et al. Secondary prevention of work disability: community-based psychosocial intervention for musculoskeletal disorders. *J Occup Rehabil*. 2005;15:377–392.
44. Cho HE, Huynh KA, Corriere MA, et al. Developing strategies for targeted improvement of perioperative education for postbariatric surgery body-contouring patients. *Ann Plast Surg*. 2020;86:463–468.
45. Baur C, Prue C. The CDC clear communication index is a new evidence-based tool to prepare and review health information. *Health Promot Pract*. 2014;15:629–637.