



Comparing expert opinion within the care team regarding postoperative rehabilitation protocol following rotator cuff repair

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Introduction: There is no established consensus regarding the optimal rehabilitation protocol following rotator cuff repair, including duration of immobilization, timing to initiate range of motion and resistance exercises, and the importance of supervised, formal therapy. The purpose of this study was to determine agreement in opinion regarding rotator cuff rehabilitation between orthopedic surgeons and physical therapists (PTs).

Methods: A 50-question survey was created on a secure data capture system and distributed via e-mail to members of professional organization affiliations. Surgeon participants were recruited from the American Shoulder and Elbow Surgeons, and PTs were recruited from the American Society of Shoulder and Elbow Therapists and the Academy of Orthopaedic Physical Therapy of the American Physical Therapy Association. Survey responses were analyzed for interprofessional differences in majority opinion and distribution of answer choices.

Results: A total of 167 surgeons and 667 PTs responded to the survey. Of the 39 questions evaluated, surgeons and PTs reached intraprofessional majority agreement in 26 (67%) and 28 (72%) statements, respectively, with agreements matching in 17 instances and differing in 4. The 2 groups had different answer preferences in 32 questions (82%). PTs were more likely to support shorter immobilization intervals ($P < .001$), earlier strengthening ($P < .001$), and more frequent home exercises ($P = .002$), whereas surgeons endorsed more conservative weight-bearing restrictions ($P < .001$), time-based phase transitions ($P < .001$), and web-based technological platforms for rehabilitation ($P < .001$).

Conclusion: Our findings show that although significant discrepancy of opinion exists within professions, greater differences in preferences exist between surgeons and PTs regarding rotator cuff repair rehabilitation.

Level of evidence: Survey Study; Experts

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Physical rehabilitation is an essential component of recovery from rotator cuff repair as it helps to ensure restoration of shoulder strength and range of motion while also

protecting tendon healing following surgery. However, there is no established consensus in the surgical community regarding several procedural elements of rehabilitation, including the duration of immobilization in the postoperative period, the timing of range of motion and resistance exercises, and the importance of supervised, formal therapy. On the one hand, early aggressive protocols may decrease postoperative stiffness and accelerate recovery, but other evidence suggests that premature loading of the rotator cuff could jeopardize tendon healing.^{24,31} Several

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clinical trials have attempted to identify optimal processes, including comparing early vs. delayed motion protocols^{4,7,9} and formal, more aggressive exercise programs vs. more traditional therapy regimens.^{6,8} However, the null findings from these trials and the discrepancy in conclusions from several subsequent meta-analyses^{3,5,6} suggest a lack of consensus agreement for many important elements of the protocol.

The rehabilitation protocols assigned to patients continue to vary, largely as a function of their providers' clinical experience and expert opinion. A recent survey study demonstrated significant variability among orthopedic surgeons regarding their preferred postoperative protocol.²¹ However, surgeons are not alone in managing the rehabilitation process. Patients reside under the additional care of their physical therapists, who rely on their own professional experience working with a variety of rehabilitation protocols to help optimize patient outcomes. Unfortunately, communication between surgical and physical therapy teams, including details of therapy prescriptions, can be unpredictable and variable. Therefore, it is important to identify any discrepancies in the professional preferences of physical therapists and surgeons regarding how to best rehabilitate rotator cuff repairs. This is particularly relevant given the recent publication of American Society of Shoulder and Elbow Therapists' consensus statement, which recommends clear time intervals of transition from immobilization to passive and active range of motion and eventual strengthening,²⁹ whereas the American Academy of Orthopaedic Surgeons Clinical Guideline Summary does not address this topic.²³

The main purpose of this study is to determine agreement and disagreement in opinion between orthopedic surgeons and physical therapists regarding the preferred processes for rotator cuff rehabilitation. We hypothesized that because of the unique aspects of professional training and experience, there would be greater discrepancy in opinion between professions than within them regarding the protocol.

Methods

This is a cross-sectional study evaluating responses from orthopedic surgeons and physical therapists to a single-time, electronically administered survey. The 50-question survey (Appendix) was generated based on review of the literature and the collaborative professional experience of the senior authors. In addition to participant demographics and experience, questions pertaining to the following variables were included: (1) initial rotator cuff tear management, (2) immobilization duration following repair, (3) early motion exercises, (4) active motion and strengthening, (5) general recommendations, (6) variables used by surgeons that impact the rehabilitation protocol, and (7) care satisfaction and expectations. Answers to each question were designed either on a 5-point Likert-type agreement scale

(1 = strongly agree; 5 =strongly disagree) or as a scale of quantity or time. Survey participants were instructed to choose a single answer deemed most appropriate, with the exception of 3 questions that, by design, allowed multiple responses.

The survey was created on a secure data capture system (SurveyMonkey [surveymonkey.com]) and distributed via e-mail to persons based on their professional organization affiliations. Surgeon participants with expertise in rotator cuff repair were recruited from the American Shoulder and Elbow Surgeons (n = 999), and physical therapists were recruited from the American Society of Shoulder and Elbow Therapists (ASSET) and the Academy of Orthopaedic Physical Therapy of the American Physical Therapy Association (n = 16,540). E-mails were obtained from the membership directories of these organizations, and the initial recruitment e-mail included a publicly accessible link for participants to follow to complete the questionnaire. The survey was open for 8 weeks following the initial recruitment, with a second reminder e-mail being sent at the 4-week mark. At the closure of the survey, the total respondents of both orthopedic surgeons and physical therapists were tabulated and analyzed.

Statistical analysis

Survey responses were analyzed in 2 different ways. First, to determine whether there was majority agreement or disagreement between and among groups, questions that generated >50% agreement for a single answer choice were considered statements of majority agreement. Likert scale responses of "strongly agree" and "agree" were collapsed, as were "strongly disagree" and "disagree." Answers categorized by intervals of time, frequency, or weight were each considered a separate answer choice. Statements of majority agreement were then tallied and compared between each group.

Second, to compare within- and between-group preferences with responses on a 5-point Likert-type scale, a Mann-Whitney *U* test was performed for each question. A Mann-Whitney *U* test was also performed to compare responses of time, frequency, or magnitude of resistance intervals. Finally, to compare responses to question 29, the only variable measured on a continuous scale, an unpaired *t* test was performed. For statistical significance, alpha was set at 0.01.

Results

There were 167 orthopedic surgeons and 667 physical therapists who completed the survey, constituting a 17% and 4% response rate, respectively. The 2 groups did not differ in time spent in practice ($P = .897$) or region of the country ($P = .598$).

Individual results of the 39 questions related to rotator cuff tear management and rehabilitation are shown in [Supplementary Table S1](#). Surgeons reached >50% agreement in 26/39 survey items (67%), whereas physical therapists reached >50% agreement in 28/39 (72%). Both professions reached at least 50% agreement with the same conclusions in 17 questions (44%). There were differences in preferences with >50% agreement between surgeons and

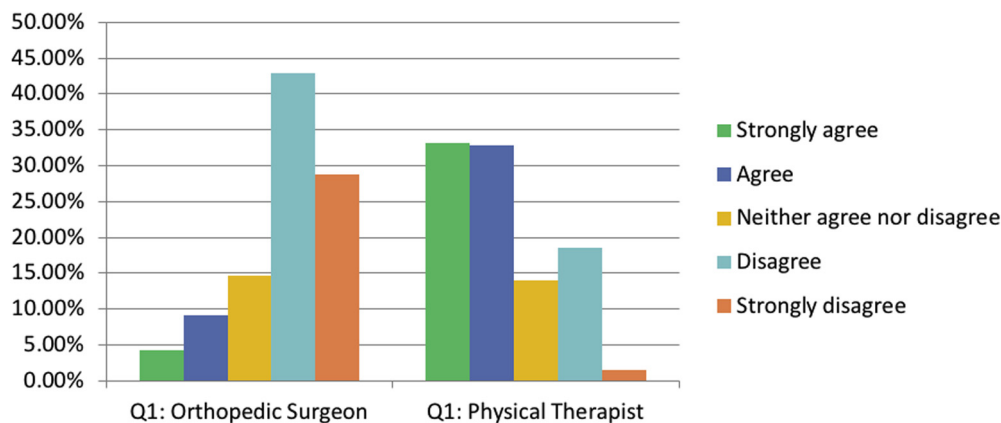


Figure 1 Agreement of surgeons and physical therapists to the statement "Physical therapy should be the primary treatment method for all rotator cuff tears, regardless of size or acuity."

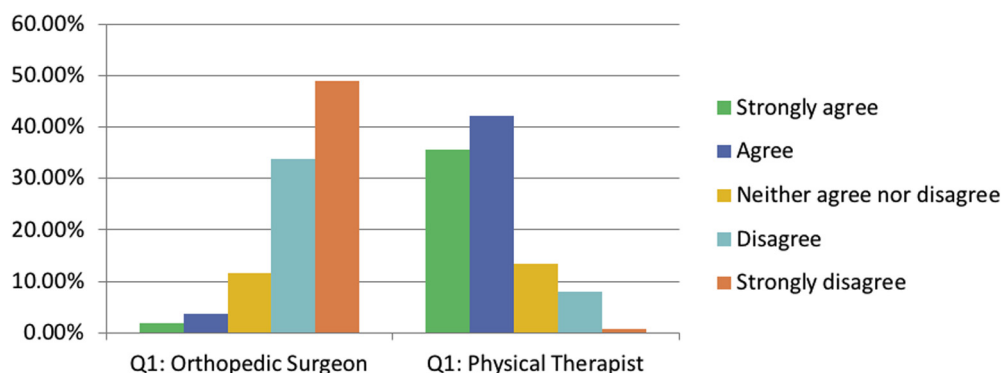


Figure 2 Agreement of surgeons and physical therapists to the statement "Physical therapy is an appropriate primary treatment for a younger (<50 years old) patient with an acute rotator cuff tear."

physical therapists with 4 items: (1) physical therapy as the primary treatment for all rotator cuff tears regardless of size or acuity (orthopedic surgeon [OS]: 72% disagree; physical therapist [PT]: 66% agree) (Fig. 1), (2) physical therapy being an appropriate treatment for younger patients with acute tears (OS: 83% disagree; PT: 78% agree) (Fig. 2), (3) timing of strengthening initiation following rotator cuff repair (OS: 69% 12-16 weeks; PT: 55% 8-12 weeks) (Fig. 3), and (4) transitioning rehabilitation phases based on time rather than criteria (OS: 54% agree; PT: 52% disagree) (Fig. 4).

Of the 39 questions, surgeons and physical therapists had statistically significantly different preferences in 32 of the questions asked (82%). Regarding initial rotator cuff tear management, physical therapists were more likely to endorse physical therapy as the primary treatment method for tears in general (Q7: $P < .001$) and for clinical scenarios that varied based on age of patient and size and acuity of tear (Q12-15: $P < .001$). Additionally, orthopedic surgeons were more likely to agree that patient age and the chronicity of tear should affect treatment (Q9-Q10: $P < .001$), whereas both groups similarly agreed that size of tear should affect treatment (Q8: $P = .398$).

Physical therapists were more likely to support shorter postoperative immobilization intervals (Q16-Q18: $P < .001$), whereas surgeons were more likely to agree that early motion (within 3 weeks of surgery) increases the risk of tendon healing failure (Q19: $P < .001$). Therapists also supported earlier active motion and strengthening exercises (Q23-Q24: $P < .001$), whereas surgeons endorsed more conservative loading of the tendon repair for the first 3 postoperative months (Q25: $P < .001$). Figures 5 and 6 show that therapists encouraged more frequent home exercise regimens for both phase I and phase II of rehabilitation (Q22 and Q27: $P < .001$). The 2 groups did not differ in whether or not pendulums are an effective exercise for decreasing stiffness (Q20: $P = .529$) (Fig. 7) or in the level of pain patients should experience during therapy sessions (Q29; OS: mean visual analog scale score [VAS] 42.1, PT: mean visual analog scale score [VAS] 42.0; $P = .601$).

In terms of general recommendations, surgeons expressed stronger agreement that patient biology, surgical factors, and therapy exercises could be the source of failed repair (Q30-32; $P < .001$); however, it should be noted that

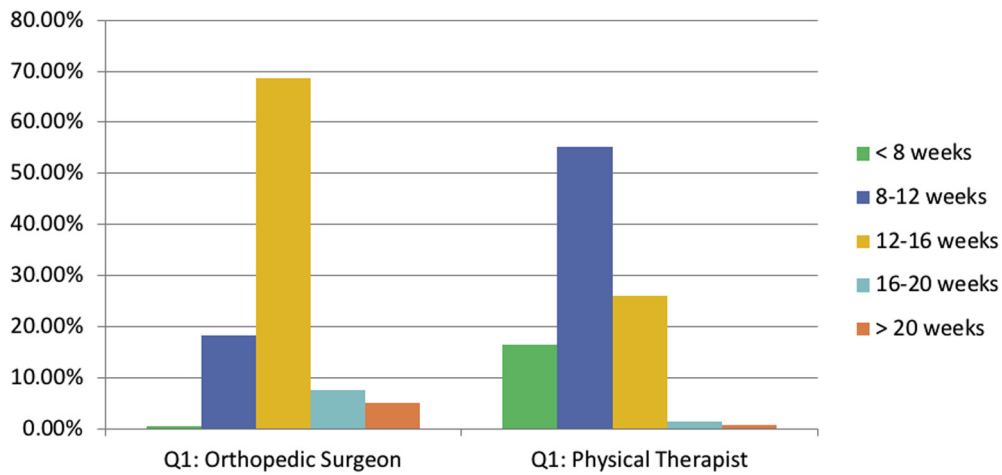


Figure 3 Answer distributions of surgeons and physical therapists to the question of how many weeks after surgery should patients begin shoulder strengthening.

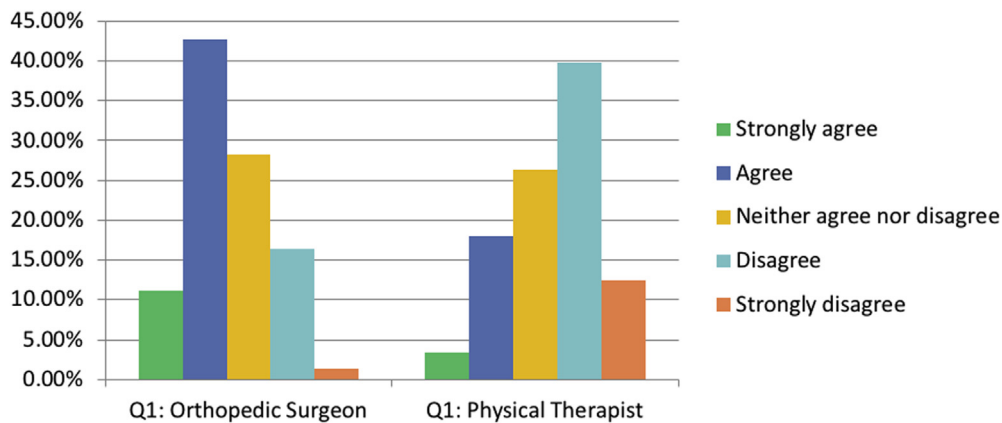


Figure 4 Agreement of surgeons and physical therapists to the statement “Phase transitions and load increases should be more time-based than criteria-based.”

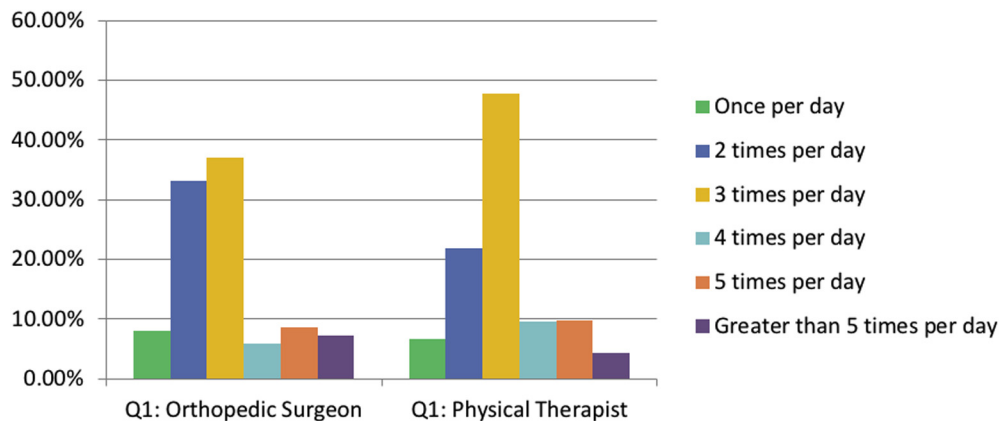


Figure 5 Answer distributions of surgeons and physical therapists to the question of how many times per day during phase I should patients be doing stretching exercises at home.

shared majority agreement was reached in each of these questions. Surgeons were also more likely to endorse time-based phase transitions (Q33: $P < .001$) and web-based technological platforms for rehabilitation (Q36-37: $P <$

.001), and less likely to endorse the necessity of formal therapy for rehabilitation (Q35: $P < .001$). Similar agreement was observed regarding the need for indefinite adherence to exercises (Q34: $P = .632$).

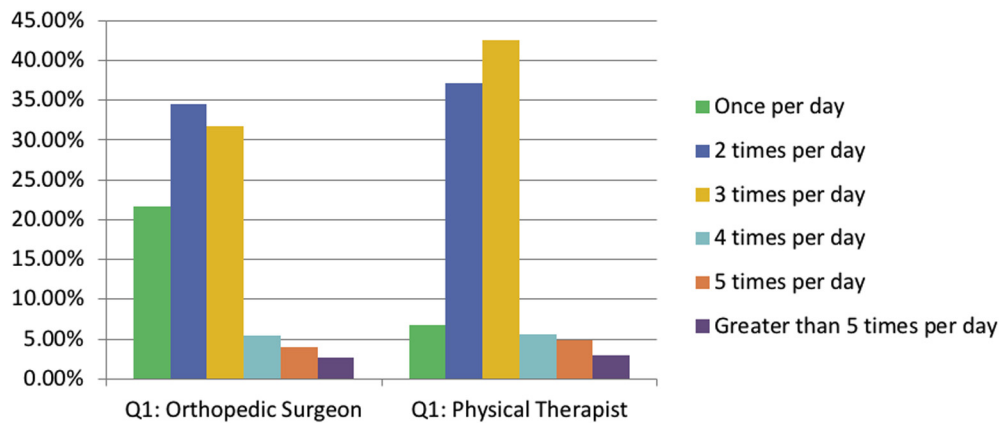


Figure 6 Answer distributions of surgeons and physical therapists to the question of how many times per day during phase II should patients be doing exercises at home.

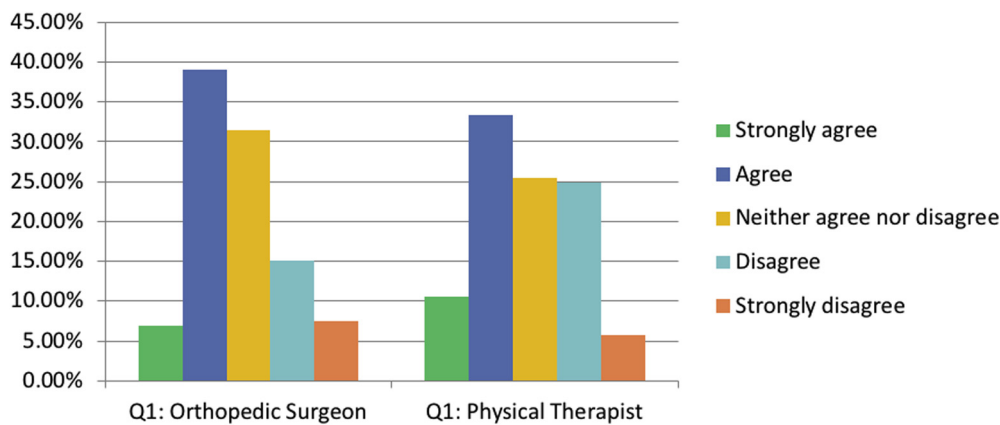


Figure 7 Agreement of surgeons and physical therapists to the statement "Pendulum exercises are an effective method for decreasing stiffness and increasing range of motion."

Lastly, surgeons were more likely to see a diminished future role of formal therapy because of evolving technology and changes to insurance programs (Q44-46: $P < .001$), and physical therapists expressed stronger agreement in the current existence of a communication gap between the 2 professions regarding patient protocols (Q48-50: $P < .001$).

Discussion

The goal of this study was to evaluate how orthopedic surgeons and physical therapists independently view the optimal protocol for rehabilitation from rotator cuff repair. The results of the survey analysis confirmed our hypothesis that significant variability in professional opinion exists regarding multiple phases of rehabilitation. This was demonstrated in 2 ways: (1) by an inability to establish majority consensus for more than half (56%) of the questions and (2) by a difference in scoring distributions between professions in 82% of questions. Of note,

there was also considerable variability seen within professions for both surgeons and therapists, with the majority agreement being achieved in only 67% and 72% of questions, respectively. This finding likely reflects the current ambiguity and lack of recognition of best practice guidelines in both professions. However, the greater discrepancy identified between professions than within them supports the claim that surgeons and therapists have inherently different opinions about how to best manage these clinical scenarios.

An important area of discrepancy found is the timing for initiating rehabilitation following repair. In general, therapists supported earlier and more frequent motion and strengthening exercises with more aggressive weight-bearing loads compared with surgeons. Early motion protocols may help combat postoperative stiffness following rotator cuff repair,^{20,28} but concerns over repair site micromotion, length of animal tendon healing,²⁷ and recurrent tears occurring up to several months post-operatively^{11,19} have generated support for delayed motion protocols. Despite several clinical trials, no protocol

variation has demonstrated a clinically significant difference in tendon retear rates. Additionally, although some studies have found improved postoperative pain and short-term range of motion with early mobilization,^{1,4,7,8} only Arndt et al¹ have reported a difference in outcomes at 1 year postoperatively. Furthermore, Mazuquin et al¹⁸ recently pooled data from various clinical trials^{1,4,9,10,12,16} and determined no difference in retear rates, pain, or functional outcome scores between early and delayed mobilization protocols. Thompson et al reached a similar conclusion, determining that no protocol was superior to another.³⁰

In large part because of lack of evidence, the American Academy of Orthopaedic Surgeons determined in 2012 they were unable to make recommendations for time intervals of the rehabilitation phases.²³ However, this statement was generated before the publication of the several aforementioned clinical trials. More recently, the ASSET recommended an immobilization period of 2 weeks before beginning protected passive range of motion, followed by active motion at 6 weeks, and strengthening at 12 weeks.²⁹ The authors do also suggest that more conservative immobilization of up to 6 weeks could be used to address concerns regarding tissue healing, including larger tears, poor tissue quality, and older patients. Despite these guidelines, our survey shows that only a minority (46%) of surgeons agree that early mobilization before 3 weeks is beneficial, compared with 88% of physical therapists. The ASSET also state that patients should only advance through rehabilitation phases based on achievement of functional milestones provided that the proper healing times have passed. Thus, both time and achievement of targeted functional milestones are needed to advance to the next phase. Our survey shows a difference in majority opinion regarding this notion, with surgeons more likely to recommend time-based phase transitions while physical therapists are not respecting time-based tissue healing to advance phases of rehabilitation. It is important for patients to be aware of the indications for the progression in their clinical care, and our results suggest this patient communication may be inconsistent from their providers.

The results of our survey also demonstrate different opinions regarding initial management of rotator cuff tears. Physical therapists were shown to be more likely to recommend physical therapy as the primary treatment in all rotator cuff tears, whereas surgeons were more likely to recommend surgery. Although outcomes of traumatic rotator cuff tears in young patients traditionally have had a higher surgical success rate than conservative management,^{15,17} treatment for degenerative tears in older patients remains less certain. For example, Lambers Heerspink et al¹⁴ and Kukkonen et al¹³ demonstrated no difference at 1 year in functional outcomes based on intention to treat surgically vs. conservatively in degenerative tears, which substantiates the preference for primary treatment with therapy. However, the former did show improved function in the subgroup with intact postoperative rotator cuff, and the latter

showed larger tear size progression in the therapy-treated group. Additionally, a study of patients with acute and degenerative rotator cuff tears by Moosmayer et al²² and recent systematic review of these trials demonstrated improved function in surgically treated patients.²⁵ Therefore, surgeons may be more likely to opt for surgical treatment based on (1) potential evidence of improved outcomes and/or (2) concern over the difficulty managing larger or irreparable tears down the road, particularly for younger patients.

Another significant finding was that surgeons expressed greater belief in the function of web-based rehabilitation programs as an adjunct or in lieu of supervised physical therapy. There is limited evidence by Roddey et al²⁶ that instructional video tapes can be as effective at improving patient-reported outcomes as supervised in-home physical therapy, and Buker et al² showed patient education and home exercise program taught by a physical therapist produced the same patient-reported pain, shoulder function, and quality life scores as did in-clinic supervised physical therapy. It is unclear, however, if clinicians believe these results are generalizable to their patients given differences in adherence between trial patients and the general population. The future role of in-clinic supervised physical therapy has been challenged given the advocacy for bundled payments and reduced health care costs, and the views of professional leadership regarding its value may help shape therapy reimbursements and consequently its future role in delivering rehabilitation protocols. Lastly, we hypothesized that both surgeons and therapists would have similar views on interprofessional communication, but the results show that physical therapists may be more frustrated with a communication gap. This suggests that the standard therapy prescription may not be a sufficient or optimal communication method in some cases. Given this finding and the overall discrepancy in opinion in the survey, future correspondence and collaboration between professional leadership may be beneficial to help improve patient care.

There are several limitations that should be considered. First of all, the survey was developed by the investigators solely for the purpose of this study, and therefore it has not been well validated. Additionally, the survey was limited by its scope in terms of question subject and answer choices. The survey did not ask questions regarding alternate pathologies that may affect management including labral tears and adhesive capsulitis, and answer choices did not offer participants the opportunity to explain the reason for their response and their confidence in the answer. Lastly, the risk for selection bias existed in the recruitment of survey participants. Surgeon participants included only a minority of American Shoulder and Elbow Surgeons and therefore may not represent the opinions of the entire society or the community of shoulder surgeons in general. Similarly, the recruitment of physical therapists included members from 2 professional organizations with different criteria of member eligibility. Surveys were distributed via professional society memberships to maximize recruitment, but could result in a lack of

generalizability to those providers who do not belong to their respective professional society. Any bias of level of clinical experience was mitigated by classifying survey responders by their years of practice and their focus on shoulder pathology.

Conclusion

Our findings show that although significant discrepancy of opinion exists within professions, greater differences in preferences and beliefs exist between surgeons and physical therapists with regard to the specifics of rotator cuff repair rehabilitation. These differences may be related to the lack of strong evidence-based guidelines but could also stem from the 2 professions' entirely independent courses of training, resources, literature, and everyday work experience. We recommend shared and updated clinical guidelines, stronger collaborative professional efforts, and continued research on rehabilitation methods to ensure that surgeons and physical therapists are consistently delivering care in concordance with the best evidence-based practice to optimize patient outcomes.

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Amee Seitz is a board or committee member of the American Academy of Orthopaedic Surgeons, Academy Orthopaedic Physical Therapy, and American Society of Shoulder and Elbow Therapists; is Research Vice Chair of the Academy of Orthopaedic Physical Therapy; and is on the editorial or governing board of the *Journal of Orthopaedic and Sports Physical Therapy* and the *Journal of Sport Rehabilitation*.

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Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jse.2020.01.097>.

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