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A modified-delphi study establishing consensus in the therapeutic management of posttrauamtic elbow stiffness

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ABSTRACT

Study Design: : Web-based modified Delphi study.
Background: : Therapy is widely considered the first choice of treatment for posttraumatic stiffness of the elbow since loss of motion is a common sequela following traumatic elbow injuries. There is high variability in practice patterns for the management of the posttraumtic elbow.
Purpose: : The aim of this study is to identify the current therapeutic management of posttraumatic elbow stiffness using expert consensus.
Methods: : This study surveyed experts using a web-based 3 round modified Delphi method. Quantitative data and comments were collected during the first round. Questions with Likert scaling were used to identify consensus (defined as 75% agreement) with each statement and comment boxes enabled open-ended responses to gather expert opinion. Lack of consensus and data from comments guided the second-round of the survey. This process was repeated after Round 2 to develop the Round 3 survey. Consensus was achieved at Round 3 and no further rounds were needed.
Results: : Round 1 included 34 experts (response rate 20%), not all experts were able to continue through all rounds. Round 2 included 18 experts and Round 3 included 15 experts. Survey items were categorized as follows: examination procedures, therapeutic interventions, orthotic intervention considerations, contributing patient factors, and clinical decisions and rehabilitation challenges. Twenty-five percent of items achieved consensus after Round 1, 30% after Round 2 and 52% after Round 3. Although most participants agreed that orthotic intervention is critical to patient outcomes, there were conflicting thoughts about the orthotic design and wearing schedule.
Conclusions: : The findings of this web-based modified Delphi study helped to establish a current body of knowledge using expert consensus to guide practice and identify specific questions that can be studied in future clinical studies on posttraumatic elbow stiffness.

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Introduction

Stiffness is a common complication after elbow trauma, with an incidence ranging from 2% to 89% often impacted by the significance of trauma and prolonged immobilization.[1-3] Loss of range of motion (ROM) at the elbow is difficult to prevent due to the constrained and congruent nature of the elbow, the capsule response to injury, and patient factors contributing to stiffness.[4-7] Once stiffness occurs after trauma normal ROM is rarely restored, and implementation of early rehabilitation is strongly supported for both operative and nonoperative management of elbow trauma.[1,8,9] While implementation of early rehabilitation is supported throughout the literature, there is currently a paucity of evidence that support therapeutic interventions, with variations identified in current practice.[1,8,10,11] Therapeutic interventions for elbow stiffness are briefly described in surgical papers with limited consistency of interventions as well as the episode of care. Currently, there is a lack of identified practice patterns and variability found in non-surgical

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therapeutic treatment. To date there are no clinical practice guidelines outlining evidence based therapeutic intervention for elbow trauma.

The aim of this web-based modified Delphi study was to identify expert consensus on the current therapeutic management of posttraumatic elbow stiffness. Areas of focus included examination procedures, therapeutic interventions, orthotic intervention considerations, contributing patient factors, clinical decisions, and rehabilitation challenges. Type of fracture and mechanism of injury were not included in the survey as these factors are more relevant to the surgical management. The reported incidence of elbow stiffness is high regardless of these factors.

Methods

Ethics approval (1904007118) was obtained from Drexel University prior to data collection. A modified web-based Delphi methodology using three rounds was used to gather consensus on the therapeutic management of posttraumatic elbow stiffness. All three round of the surveys were created using Qualtrics. The Delphi methodology has been identified as an effective tool in establishing consensus when a lack of high level evidence is present.[12] The use of a modified web-based Delphi method allows for anonymity, limits time burden on participants and allows for the inclusion of a wider geographical area to help capture treatment variations across regions.

Surveys were distributed and data was collected in Qualtrics using an anonymous link assuring that the responses were not identifiable and no identifying information was collected. A Likert scale is commonly used in Delphi rounds and allows for data to be analyzed using rating techniques. The Likert scale allowed participants to select level of agreement ranging from strongly agree to strongly disagree. Agreement was calculated on each Likert scale question during each round. There is no established level of consensus outlined in the Delphi literature but it has been identified that predetermined level of consensus reaching 75% is considered high.[13] On sequential rounds, statements reaching 75% consensus were validated and data was provided on items not reaching the 75% threshold. This web-based modified Delphi study was used to identify current therapeutic interventions used in the treatment of posttraumatic elbow stiffness as described by expert therapists in the field of hand and upper limb therapy.

Participant recruitment

The inclusion criteria used to define an expert in this study were: Occupational (OT) or Physical Therapists (PT) with the Certified Hand Therapist credential (CHT), or board certified orthopedic clinical specialist (OCS) PT, or had published or presented on traumatic elbow injuries at a nationally recognized meeting, or treat at least 10 traumatic elbow injuries per year. Due to the low incidence of traumatic elbow injuries, 10 per year was established as minimum threshold for expertise. Purposeful sampling was used to obtain the participants of this study through professional networks and by asking participants that are known as experts in the field and those who have published articles on therapeutic management of the elbow to participate. Also, tertiary hand centers throughout the US were researched to identify current upper extremity therapists and emails were collected. There is no established sample size identified in the Delphi literature; however, with a homogeneous group a minimum sample size of 10 has been supported in the literature.[13] Due to participants belonging to the same field and the limited number of traumatic elbow injuries seen in the clinic, a minimum sample size of 15 was established as a benchmark for each round. A total of 168 experts meeting the criteria were identified and sent the 3 surveys. Participants were given on average 5 weeks to complete the survey. Survey collection was extended when necessary to reach minimum sample size. Participants were encouraged to complete any or all of the surveys to help decrease response fatigue.

Delphi questionnaires (Rounds)

Three separate Delphi surveys were conducted. An invitation email explaining the purpose and design of the study was included. Estimate to time commitment and assurance of nonidentifiable data collection was provided along with an anonymous link to Qualtrics. The purpose of Round 1 was to collect expert opinion on a wide range of examination procedures, therapeutic interventions, orthotic intervention considerations, contributing patient factors, and clinical decisions and rehabilitation challenges. Questions designed to collect data on clinical decision making and timing of interventions were included. A five-point Likert scale was used in Round 1 to capture varying therapist opinion, it was then reduced from 5 to 4 on the second and third round to drive consensus. Participants were encouraged to provide rationale, justification, and suggestions for additional items not included on the survey in the form of a text box on each question. All suggestions included by the experts were included in the following rounds. Operational definitions for traumatic elbow injury, stiffness, intrinsic pathology, extrinsic pathology, high load brief stretch, and reactive flare were established and provided to participants during all three rounds both within the survey and on the invitation email.

Due to the potential for different experts participating in each round, items that reached consensus (75%) on Round 1 and 2 were validated on the sequential round by asking participants if they agreed with the statement that had reached consensus. Additional items were included and new questions created based on participants comments from the text boxes. A four-point Likert scale was used for Rounds 2 and 3. After each round descriptive statistics were run and frequency was calculated. Data was reported as percentages.

Results

The survey response rate was 20% ($n = 34/168$) in Round 1. Demographic information including years in practice, education level, practice credential, and primary work setting are summarized in Fig. 1. In Round 2, 18 experts ($n = 18/168$) completed the survey, while fifteen ($n = 15/168$) participated the third and final round. Each round met the minimum participant size established for the study. The same expert pool was used for all 3 rounds. Experts were able to participate in any or all rounds, so to decrease time burden demographic information was only collected from participants in Round 1. Respondents varied by survey round, with the majority of respondents working in an outpatient clinic doing direct patient care 76%-100% of the workday. Over 78% of experts in this study possessed the CHT credential and had been practicing for over 16+ years, with 100% of respondents being “very confident or somewhat confident” in the treatment of the posttraumatic stiff elbow. The survey items were categorized as follows:

Examination procedures

Greater than 75% of respondents identified a high pain score, prolonged immobilization period, a significantly limited arc of motion, edema, fear avoidance, hard capsular end feel, reactive flare to interventions, and a lack of progress as predictive indicators of a substantial problem of elbow stiffness. Three patient reported outcome measures met consensus the Numeric pain rating scale (91%),

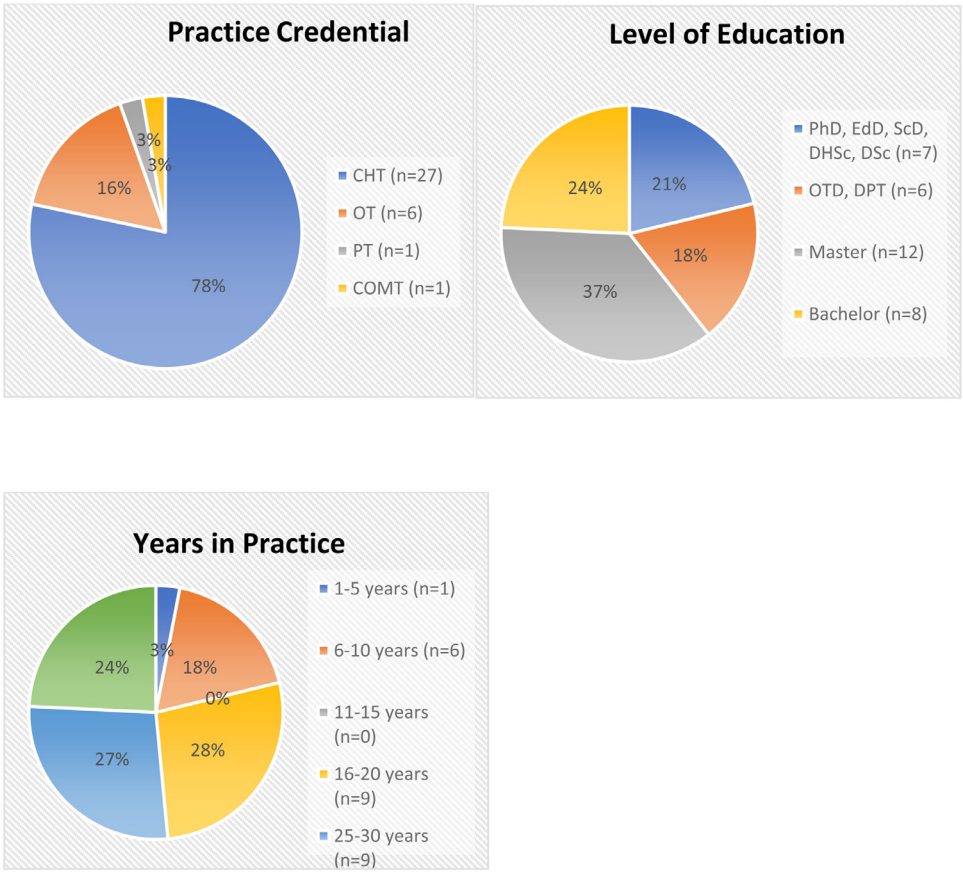

Fig. 1. Demographic Information collected from the 34 participants from Round 1. (COPM) Certified orthopedic manual therapist; (PhD) Doctor of Philosophy; (EdD) Doctor of Education; (ScD) Doctor of Science; (DHSc) Doctor of Health Science; (DSc) Doctor of Science; (OTD) Occupational Therapy (DPT); Doctor of Physical Therapy. For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article

Visual Analog Scale from pain at (93%), and the QuickDash (83%). See Table 1 for summary of consensus for examination procedures.

Interventions

In regard to effectiveness of interventions in Round 1, therapists reported orthotic intervention (85%), home exercise program (82%), passive ROM (82%) and functional activities (76%), as "always or frequently" effective. In Round 2, simultaneous heat and stretch (83%), AAROM (83%) and keeping the elbow at end range (89%) met consensus. Finally in Round 3, scar tissue management (100%), and muscle energy techniques (93%) met consensus. Figure 2 summarizes interventions identified as effective in the management of elbow stiffness.

Therapeutic interventions "always or frequently" used in clinic to regain ROM reaching consensus included weighted stretch, joint-based mobilizations, passive ROM, active ROM, functional activities, soft tissue mobilization, heat with weighted stretch, and mobilization with movement were identified based on direction of limitation in ROM (Fig. 3). A summarized list of all therapeutic interventions reaching consensus in the management of posttraumatic elbow stiffness is outlined in Table 2.

Orthotic intervention

Low load prolonged stretch was identified by 87% of participants as the most effective intervention for lengthening adaptively shortened periarticular soft tissue at the elbow and 97% of participants identifying it as more effective than high load brief stretch. Comments were collected on orthotic design and wearing schedule or prescription for each direction of motion. Numerous variations on the orthotic design existed with only an anterior long arm static orthosis used for gaining passive extension meeting consensus (93%). Greater than 60% of respondents reported the selection of orthotic design was dependent on the degree of passive ROM limitations. In regard to orthotic prescription, the recommended wearing frequency of 30 minutes to an 1 hour, 3-4 times per day met consensus (75% threshold) for flexion, pronation and supination orthoses and validated in sequential rounds at over 85%. A recent survey in Australia hand therapists found that serial static orthosis are often prescribed at 8 weeks after surgery and static progressive orthoses at 12 weeks.[14] However, no optimal time to start orthotic intervention after trauma was identified in this study. Orthotic intervention statements reaching consensus are outlined in Table 3.

Clinical reasoning and rehabilitation challenges

The optimal timing to begin treatment after traumatic elbow injury was identified at week 1 (88%) with over 89% ($n = 26$) of the experts reporting that they saw the patients in the clinic 2 times per week. Sixty seven percent of the respondents ($n = 10$) report they are "frequently" able to restore full ROM of a posttraumatic stiff elbow, and 33% ($n = 5$) responded that they "rarely" could restore full ROM and no experts reported they "always" restored full motion. More than 88% of participants identified extension as the most difficult direction of motion to recover. Therapists identified weeks 2-4 as the most common time when they identify clinical

Table 1
Examination procedures that reached consensus

Consensus statement	Items reaching consensus	Consensus	Validation level
Impairment-based tests and measures used as part of initial examination	Goniometry (PROM)	96.97% (R1)	94.44%
	Goniometry (AROM)	100% (R1)	
	Palpation	82.35% (R1)	
	Assessment of joint mobility	88.89% (R2)	100%
	Grip testing (Dynamometer)	83.33% (R2)	
	Assessment of soft tissue extensibility	88.88% (R2)	
	Occupational Profile^,*		
	Arm circumference	86.67% (R3)	n/a
Physical tests or signs to distinguish between intrinsic vs extrinsic ROM limitations	PROM	100% (R1)	100%
	AROM	100% (R1)	
	End feel	100% (R1)	
	Change in status	83.87% (R2)	93.33%
	Lack of progression^	94.11% (R2)	
	Scar mobility*	82.35% (R2)	
	End feel quality	100% (R3)	n/a
Patient self-report outcomes measures used during an initial evaluation	Numeric pain rating scale	90.91% (R1)	100%
	QuickDash	83.34% (R2)	83.33%
	Visual Analog Scale	93.34% (R3)	n/a
Clinical signs and symptoms that indicate a substantial problem with elbow stiffness	High pain score^	97.06% (R1)	100%
	Fear avoidance^	79.41% (R1)	
	Edema	84.84% (R1)	
	Prolonged immobilization^	91.18% (R1)	100%
	Hard capsular end feel	88.23% (R1)	
	Significant limited arc of motion	91.18% (R1)	
	Lack of progression in ROM*	88.23% (R2)	
	Reactive flare to interventions*	80% (R3)	n/a
Injury characteristics often found in a patient with a passive ROM limitation in both flexion and extension	High level of trauma	96.97% (R1)	100%
	Long immobilization time^	84.84% (R1)	
	High number of comorbidities	75.75% (R1)	
	Edema	75.75% (R1)	
	Nerve irritation*	78.57% (R3)	
	Low pain threshold^	85.71% (R3)	n/a
PROM direction most difficulty to recover	Extension	83.33% (R2)	80%

^ No operational definitions provided
* Responses provided by experts in open text box

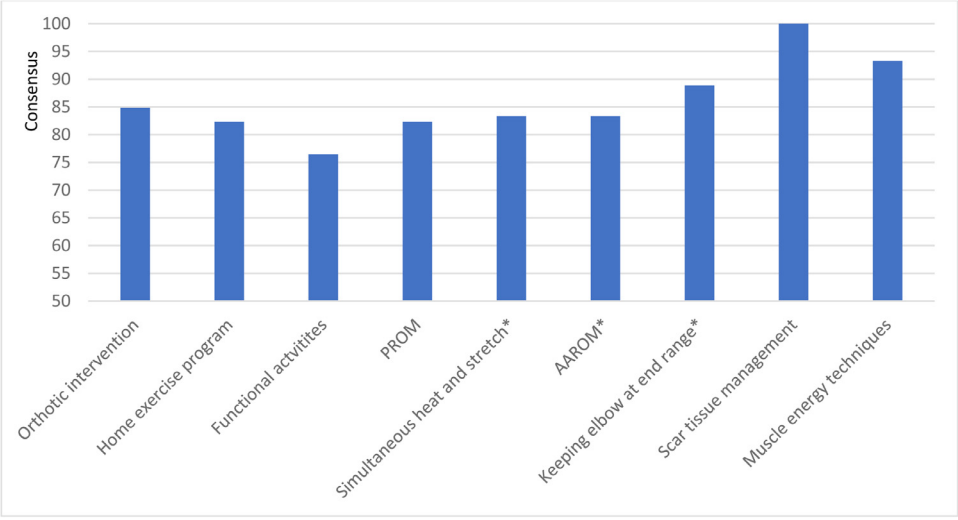

Fig. 2. Interventions identified by experts reaching a minimum of a 75% consensus as effective in gaining PROM of the posttraumatic stiff elbow. PROM- Passive range of motion; AAROM- Active assistive range of motion. *Responses provided by experts in open text box. For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article

signs and symptoms that indicate elbow stiffness will be a problem (89.66%, $n = 26$). Factors that present a challenge in treating the posttraumatic stiff elbow were identified by the experts. These factors included pain (94%), patient adherence (82%), gaining ROM (94%), Ulnar nerve neuritis (80%), and edema (80%). Patient factors, personal factors, environmental factors and comorbidities that impact the development of posttraumatic stiffness were also identified and are outlined in Table 4.

Participants identified low load prolonged stretch as the most effective method for lengthening adaptively shortened periarticular soft tissue at the elbow (87%) followed by patient passive stretch (75%) and heat with weighted stretch (87%). When asked if or-

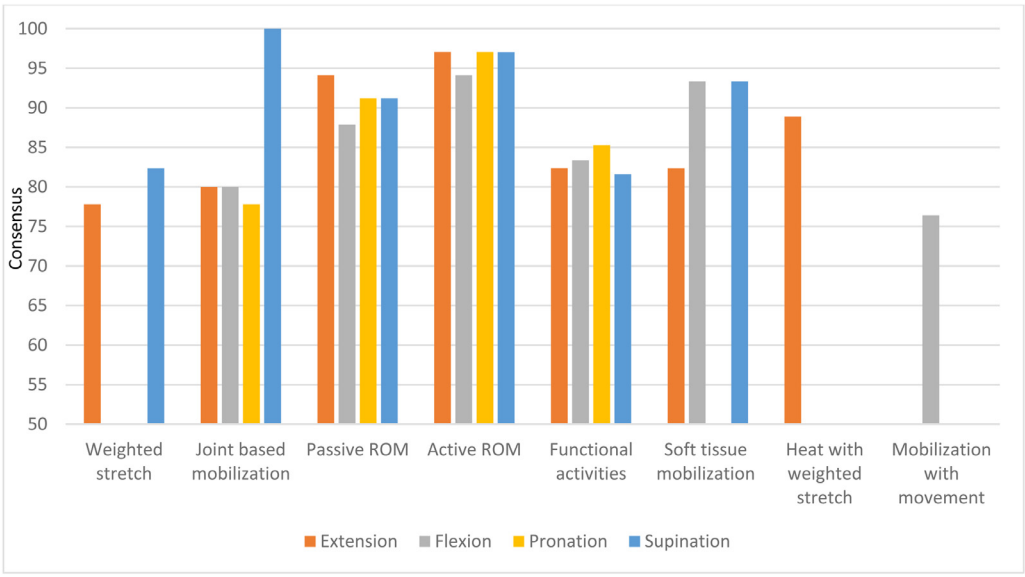

Fig. 3. Therapeutic interventions "always or frequently" used in the clinic to gain ROM reaching consensus. ROM- range of motion. Always and frequently were combined to achieve consensus for each direction. For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article

Table 2
Summary of effective interventions in the management of posttraumatic elbow stiffness

Treatment interventions supported by consensus	
Orthotic interventions (84.95 %)	Soft tissue mobilization (100%)
Home exercises program (82.35%)	Joint based mobilization (80%)
Functional activities (76.47%)	Mobilization with movement (76.47%)
PROM (82.35%)	Manual edema mobilization (80%)
AROM (78.83%)	Muscle energy techniques (93.33%)
AAROM (83.34%)	Scar tissue management (86.66%)
Strengthening (86.66%)	Weighted stretch (80%)
Adaption of tasks (94.45%)*	Simultaneous heat and stretch (83.34%)* Keeping elbow at end range (88.88%)*

* Responses provided by experts in open text box

thotic interventions was the next step to improve passive ROM when a patients ROM has plateaued after 2 weeks of therapeutic exercises and manual techniques, 100% consensus was achieved. However, no clinical decision making tool for orthotic intervention was identified. Factors reaching consensus that are often a predictor to when a patient will require surgical release of the capsule are outlined in Fig. 4.

Discussion

This study investigated the current practice of experts in the field of elbow rehabilitation to identify practice patterns and clinical reasoning for the management of the posttraumatic stiff elbow and gain consensus. Survey responses indicate that the optimal timing for referral to therapy occurs at 1 week after traumatic injury which is consistent with the medical literature supporting early implementation of therapy after surgery.[1,8-10,15] Significant variation in postoperative protocols have been identified in the literature,[9] with limited information on the episode of care. Typical duration of an episode of care identified by participants was 8-12 weeks (86.67%), averaging 2 visits per week (89.66%).

Consensus was established for a variety of therapeutic interventions early on in Round 1 including AROM, AAROM, PROM, edema techniques, and orthotic intervention all of which are sup-

Table 4
Summary of factors reaching consensus for the development of posttraumatic stiffness

Consensus statement	Items reaching consensus	Consensus	Validation
Comorbidities that contribute to the development of posttraumatic elbow stiffness	Associated soft tissue injury (burns, nerve irritability) (R1)	84.84%	100%
	Psychosocial factors (R2)*	88.23%	
	Multiple comorbidities (R2)	82.36%	
	Increasing pain (R2)	94.11%	100%
Environmental factors that contribute to the development of posttraumatic elbow stiffness	Long immobilization time (R1)^	82.35%	100%
	Late referral to therapy (R1)	79.41%	
Personal factors that predict who will get posttraumatic elbow stiffness	Low pain threshold (R1)^	82.36%	83.33%
	Smoker (R2)	82.35%	73.33%(NV)

(R1)Consensus met in Round 1, (R2) Consensus met in Round 2
(NV) Not validated
^ No operational definitions provided
* Responses provided by experts in open text box

Table 3
Orthotic prescription reaching consensus in Rounds 1, 2, and 3.

Consensus statement	*Items reaching consensus*	*Consensus*	*Validation*
Factors identified as important in confirming there is a need for orthotic intervention to increase PROM In Round 1	Significantly limited arc of motion (R1)	100%	88.89%
	Capsular end feel (R1)	100%	
	No gain in ROM after preconditioning (R1)	93.94%	
	Pain with active or passive range of motion (R1)	82.35%	
	PROM has plateaued (R1)	100%	
Recommended prescription for duration of wearing a flexion orthosis	30 min-1 H per session (R1)	88.24%	88.89%
Recommended prescription for frequency of wearing a flexion	3-4 times per day (R1)	94.12%	94.44%
Recommended duration of wearing a pronation orthosis	30 min-1 H per session (R2)	78.79	86.67
Recommended prescription for frequency of wearing a pronation orthosis	3-4 times per day (R1)	75.76%	88.89%
Recommended prescription for duration per session of wearing a supination orthosis	30 min-1 H (R1)	78.13%	88.89%
Recommended prescription for frequency of wearing a supination orthosis	3-4 times per day (R1)	87.88%	94.44
Complication found frequently when implementing orthotic intervention as part of your plan of care	Patient compliance (R2)	82.35%	100%
Most frequently prescribed orthosis for passive extension limitation	Anterior long arm static orthosis	83.34%	93.33%
	Anterior serial static remolded to accommodate new end range (R2)	81.25%	
Orthotic design for extension/flexion changes when there is a limitation in both directions	Yes (R2)	94.44%	N/A
Do you agree it is not appropriate to provide orthotic intervention for elbow flexion during sleeping hours	Yes, NOT appropriate (R3)	93.33	N/A
Long wearing times (over 2 H)increases effectives of orthotic interventions compared to shorter wearing times	Yes (R3)	93.33%	N/A

(R1)Consensus met in Round 1, (R2) Consensus met in Round 2, (R3) Consensus met in Round 3

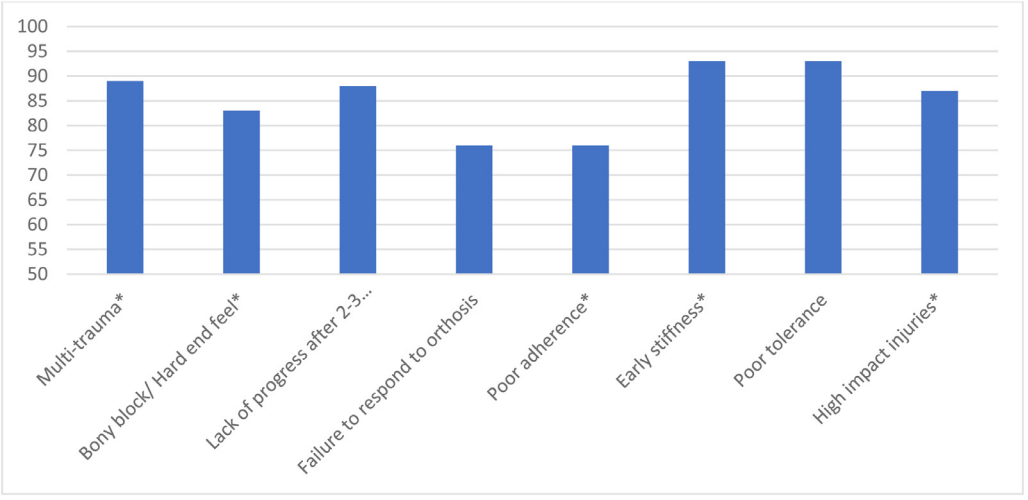

Fig. 4. Predictors of surgical release identified by percentage of consensus among experts. * Responses provided by experts in open text box. For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article

ported in the literature.[11,16,17] Although joint-based mobilization and several manual techniques reached consensus in Round 2 and 3 in this study there is currently minimal high level evidence to support these interventions in the literature[18,19] Numerous interventions were suggested by participants during each rounds that were added to the subsequent round and were not developed or defined by the authors. Respondents did not strongly support effectiveness or use of physical agents (66.7%) or thermal agents (48.48%) for treatment of the stiff elbow, which is consistent with the lack of studies identified addressing physical agents in traumatic elbow rehabilitation. Since the general category did not reach consensus we did not address types of physical agents unless they were specifical identified by the participants. Several rehabilitation interventions reached consensus as "never or rarely" used for the stiff elbow including use of continuous passive motion (CPM), low level laser, meditation, biofeedback, cupping, and warm whirlpool. Therapists identified these as either not effective, no access to the intervention or no experience in the use of them.

Patient-rated outcomes are commonly used in practice and have been identified in the literature as an integral component in determining therapeutic outcomes.[20] The Disabilities of Arm, Shoulder and Hand Questionnaire (DASH), American Shoulder and Elbow Surgeons Evaluation Instrument (ASES-e) and the Patient-Rated Elbow Evaluation (PREE) have all been found to be valid and reliable measures for the elbow.[10,21-23] Survey responses inform us that the Visual Analog Scale, Numeric Pain Scale, and the QuickDash are commonly used patient-rated outcome measures. Experts in the study identify common functional complaints after elbow trauma including, inability to comb hair or turn a doorknob these functional activities would not be captured with use of the QuickDash. The Patient-Rated Elbow Evaluation was found to identify more functional limitations than the American Shoulder Elbow Surgeons- elbow form.[24] Use of a outcome measure that included activities that captured functional limitations common after elbow trauma may help improve outcomes of elbow patients.

Injury characteristics that experts associated with multidirectional ROM limitations included a prolonged immobilization time,

a high level of trauma, edema, low pain threshold, and nerve irritation, which are supported in the literature.[4,25,26] Respondents also identified associated injury such as burns and peripheral nerve injury as being associated with multidirectional motion limitations. Comorbidities such as obesity, diabetes, cardiac, neurologic, and rheumatologic conditions did not reach consensus. Disparate views regarding priority in ROM when all directions are limited with 40% of respondents prioritizing extension, supination, flexion then pronation, while 20% identified supination, flexion, extension, pronation and over 26% selecting other variations. Responses to the question regarding ability to restore full passive ROM of a posttraumatic stiff elbow inform us that 67% of therapists frequently restore full motion while 33% report they "rarely" regain full passive ROM. Difficulty regaining normal ROM after elbow stiffness has developed has been identified in the literature.[1] Further investigation is needed to develop a clinical decision making tool to help guide identifying rehabilitation priorities in complex multidirectional posttraumatic elbows.

As anticipated, the use of orthotic intervention for the management of elbow stiffness reached high levels of consensus consistent with the literature.[17,27,28] Responses to the questions regarding the use low-load prolonged stretch as an essential component of therapeutic intervention was consistent throughout the three rounds. No clinical decision making tool was identified by respondents used to determine orthotic intervention. Exactly which orthosis is most effective in restoring ROM after elbow trauma was not established, which is consistent with the literature. This may be due to orthosis selection being dependent on patient compliance, end feel, and degree of contracture.[29]

There is little evidence supporting a specific orthosis wearing schedule in the elbow literature. Participants in this study recommended a wearing schedule of 30 minutes-1 hour, 3-4 times per day for flexion orthoses, supination orthoses, and pronation orthoses, which is consistent with the recommendations of a 2013 systematic review.[27] Participants' responses varied regarding wearing schedule for extension orthoses with 47% recommending wearing the orthosis overnight while 53% recommending wearing the orthosis at night and intermittently during the day. Therapists identified the patient's tolerance to the orthosis as the biggest impact to clinical decision making. Expert recommendations in this study align with the current literature highlighting that therapists rely on a wide variety of orthoses style dependent on the phase of healing, directions, and degree of limitation.[29,30] Only 19% of participants reported using any clinical decision making tool to help guide implementation of orthotic intervention with the most commonly identified tool being the Modified Weeks Test.[31]

Limitations

Low response rate occurred across all three rounds ranging from 19% in Round 1 to 9% in Round 3. The time to complete the survey in each round may have been a barrier for busy clinicians, although each survey was constructed to be completed in under 30 minutes. The use of the survey methodology limits the ability for the therapists to provide details to their survey responses to capture a clearer picture of experts' clinical reasoning. The response items provided by experts in the text boxes were not operationally defined by researchers or participants in sequential rounds. Although items achieved consensus the authors recognize there is no operational definition or measure for items such as low or high pain threshold, occupational profile, fear avoidance and prolonged immobilization.

Conclusion

This modified Delphi study provides information on current practice on the management of posttraumatic elbow stiffness. Experts' consensus in this study confirmed that patients with traumatic elbow injuries should be referred to therapy during the first week of injury to minimize posttraumatic elbow stiffness, especially if the high pain scores, edema, or fear of movement are present. The experts also agreed that orthotic intervention was the most effective method to restore elbow motion following the development of posttraumatic stiffness, but further investigations are needed to identify orthotic design and prescription.

Findings of this study support the need for future high-level studies looking at effectiveness of recommended therapeutic interventions. Future studies will help bridge the gap between current practice and the existing evidence to establish clinical practice recommendations to improve patient outcomes and control costs.

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Quiz: # 846

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1. How many rounds were needed to reach consensus?
   a. 10
   b. 1
   c. 2
   d. 3

2. To be included as a so-called expert, a therapist had to treat a minimum of _____ traumatic elbow patients in a year
   a. 5
   b. 25
   c. 10
   d. 100

3. Commonly encountered clinical issues included
   a. reactive flares to interventions
   b. reluctance to wearing splints
   c. altered esthetics secondary to limited ROM
   d. insurance company's declining reimbursement for therapy

4. The experts agreed that the chief intervention was
   a. manual therapy
   b. orthotic wearing
   c. physical agent modalities
   d. therapeutic exercise

5. The Modified Weeks Test was the most commonly identified tool for assessing orthotic intervention
   a. false
   b. true

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