



Full Length Article

The 2019 practice analysis of hand therapy and the use of orthoses by certified hand therapists



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ABSTRACT

Background: In 2019, the Hand Therapy Certification Commission (HTCC), in consultation with Scantron Corporation, performed a practice analysis study of hand therapy, the sixth in a series of similar studies performed by HTCC over a 35-year period.

Purpose: The primary goal of this study was to update and validate the definition and delineation of hand therapy and to ensure that the test content outline for the Hand Therapy Certification Examination (HTCE) reflects the critical tasks, knowledge, and skills required in the practice of hand therapy. Additionally, HTCC explored specific trends in hand therapy practice, compared findings with previous studies, and gathered data about the frequency, criticality, and performance expectations for the use and fabrication of orthoses by hand therapists.

Study Design: Quantitative Descriptive.

Methods: More than 40 subject matter experts from the United States and Canada, representing a broad range of experiences and perspectives, developed an updated delineation of the domains, tasks, knowledge, and techniques and tools used in hand therapy practice. A large-scale online survey of all certified hand therapists from the United States, Canada, and other countries was completed to test the profile within the practice of hand therapy.

Results: This large-scale online survey overwhelmingly validated the profile of hand therapy. The results affirmed the test specifications for the Hand Therapy Certification Examination; affirmed the definition of hand therapy; and refined the scope of hand therapy practice. New data was gathered regarding the use of orthotics in hand therapy.

Conclusions: This study establishes content validity for the HTCE. It highlights that the specialty of hand therapy is a mature and stable specialty field of occupational therapy and physical therapy. Certified Hand Therapists frequently issue pre-fabricated and fabricate custom orthoses in the course of rehabilitation for clients with hand and arm injuries, and overall consider this a highly critical task in hand therapy practice.

Level of Evidence: N/A

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Introduction

Certification in Hand Therapy is a voluntary credentialing program established in 1989 by the Hand Therapy Certification Com-

mission (HTCC) to certify occupational therapists (OTs) and physical therapists (PTs) in the advanced clinical specialty of rehabilitation of the upper limb. The Certified Hand Therapist (CHT) credential is a designation of excellence in hand therapy. A CHT is an OT or PT who has a minimum of three years of clinical experience, including 4,000 hours or more in direct practice in hand therapy, and who has passed the comprehensive Hand Therapy Certification Examination (HTCE). The HTCE is a test of advanced clinical

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skills and theory in upper limb rehabilitation. The examination, offered since 1991, covers the broad knowledge required for clinical intervention as well as the basic science and theory that support clinical treatment. A therapist must recertify every five years by examination or by accruing hours of work experience and professional development to continue to ensure that individuals maintain clinical competence. The program serves the public and hand therapy community by maintaining high standards in the practice of hand therapy, enhancing the quality of patient care, recognizing OTs and PTs who have achieved this advanced level of professional knowledge, and encouraging participation in continuing education and professional development.

In 2019, HTCC, in consultation with the examination and credentialing specialists from Scantron Corporation (Scantron), performed the sixth in a series of practice analysis studies that have been conducted by HTCC over a 35-year period. Previous studies were completed in 1985, 1994, 2001, 2008, and 2014.^{1,2,3,4,5} Additionally, the 2001 study included an in-depth analysis of competencies in hand therapy.⁶ In professional credentialing, the primary benefit of conducting a practice analysis is to create a logically sound and legally defensible empirical foundation for examination development. The practice analysis, which surveys hand therapists regarding the tasks, knowledge, and skills needed for clinical practice, results in a test content outline for the HTCE, which is used to guide item writing and examination construction, linking the examination content with clinical practice. Best practice in credentialing suggests that updated practice analyses be conducted every five to seven years to ensure that the examination content remains relevant to current practice, or more frequently if warranted by the pace of change in the profession.^{7,8,9} Each study takes approximately three to four years to complete from initial planning to publication.

The primary goal of this practice analysis study was to update and validate the definition and delineation of hand therapy and to ensure that the test content outline for the HTCE reflects the critical tasks, knowledge, and skills required in the professional practice of hand therapy. Additional goals of the study were to:

- Evaluate frequency, criticality, and performance expectations regarding the use of orthoses in hand therapy practice.
- Identify emerging and receding trends in hand therapy.
- Consider whether advances in the entry-level degree required for occupational therapy and physical therapy have impacted hand therapy practice.

Methods

Updating the practice analysis

HTCC desired to adhere to established standards for the conduct of job analysis studies, the family of methods to which practice analysis belongs. These standards have their foundation in logically sound and legally defensible procedures drawn from psychometric literature and case law. Essential principles and procedures are outlined in federal regulation¹⁰ and manuals, such as Standards for Educational and Psychological Testing¹¹. Scantron employed these standards as well as those of the National Commission for Certifying Agencies^{9,12} throughout the study. In accordance with these standards, HTCC assigned responsibility for conducting the practice analysis to a Practice Analysis Advisory Committee that comprised five CHTs who had experience with HTCC, the certification examination, and the organization's history with similar studies. The group, which met in periodic conference calls to consult with Scantron about objectives, methods, and the formulation of conclu-

sions, was instrumental in the design and implementation of the study.

Of significant importance to the study was preliminary activity that helped to inform the starting point for the practice analysis. This activity included a thorough review of previous practice analysis studies in hand therapy, as well as the most recent practice analysis studies in occupational therapy¹³ and physical therapy¹⁴. Readings also included *Rehabilitation of the Hand and Upper Extremity*, 6th Edition¹⁵ and *Hand and Upper Extremity Rehabilitation*¹⁶, as well as descriptions of specialty practice for occupational therapy driving and community mobility and orthopedic physical therapy.^{17,18} Beyond the readings was a written assessment of the views of leaders in the specialty about changes in practice since the last study (2014) and trends or innovations that might influence practice in the foreseeable future. This information was collected in early February 2019, by means of a written survey sent to 25 current and past leaders in the specialty, addressing such topics as changes in practice during the previous five years, new content in hand therapists' education, difficulties that new hand therapists face in their work, strengths and weaknesses of the 2014 content outline, and changes that may develop in the upcoming five-year period. Reviewing the related studies and analyzing data from the preliminary survey helped Scantron staff plan the study more effectively.

The five members of Practice Analysis Advisory Committee and an additional group of nine experienced Certified Hand Therapists made up the Practice Analysis Task Force. This group met in person to analyze the input received from leaders in hand therapy and the foundations of the practice of hand therapy in a two-day meeting held in Scantron's Raleigh, NC, offices on March 22 and 23, 2019. An instruction booklet provided definitions and examples for practice analysis terminology that was used in the meeting. The combined group negotiated the outline of domains, tasks, knowledge areas, tools and techniques, and orthoses that defined the role of the CHT and the competencies that CHTs must possess in order to serve clients proficiently. The outline included three performance domains, 15 tasks, and one content domain, as well as a list of treatment techniques and tools and orthoses used in hand therapy. The group represented a variety of practice settings, regions of the country, and levels of experience. By resolving differing perspectives about practice based on these differences, the group worked to reach consensus and ensure the relevance of the outline and competencies across the specialty.

Developing the survey

Following the meeting, Scantron staff and members of the Practice Analysis Advisory Committee reviewed the updated outline as part of the process of developing a large-scale survey. The purpose of the survey was to assess the relationship of the domains, tasks, knowledge areas, tools and techniques, and orthoses to the practice of hand therapy. All CHTs were asked to complete the online survey, which was developed and refined in April and May 2019, and field-tested by means of a pilot survey conducted in late August 2019. The survey complied with all relevant aspects of the Checklist for Reporting Results of Internet E-Surveys (CHERRIES)¹⁹. The survey included a set of demographic questions to supply the basis for assessing if the group of respondents to the survey aligned reasonably to the known characteristics of the population of CHTs. The demographic portion of the survey also included questions that provided insight into the practice of respondents. The final questions asked respondents to record their opinion about what portion of the certification examination should be devoted to the proposed domains and to those in place at the time of the survey. The Practice Analysis Advisory Committee also negotiated three scales

that would be used in the large-scale survey. The scales were as follows:

Frequency: How often do you perform the domain or task or use the tool, technique, or orthosis?

Never

Rarely (monthly or less)

Sometimes (weekly or almost weekly)

Often (daily)

Repeatedly (several times a day)

Criticality: How critical is the domain or task or the tool, technique, or orthosis to optimizing outcomes for your hand therapy patients?

Not critical

Minimally critical

Moderately critical

Highly critical

Performance Expectation: Should a certified hand therapist be able to perform the tool or technique or to fabricate or use the orthotic device as an intervention?

Should not be required

During formal education

Prior to CHT certification

Upon CHT certification

Within years after CHT certification

The survey was loaded into one of Scantron's survey drivers, programmed in Cold Fusion 9.0, and then reviewed by the Practice Analysis Advisory Committee to ensure that the language and functionality of the survey were optimal. Once all suggestions for change had been incorporated, HTCC notified pilot survey participants to expect the survey invitation, and Scantron launched the pilot survey on August 20, 2019, with follow-up correspondence leading to the deadline of September 3. Receiving the invitation to participate by email, participants clicked on a personalized Uniform Resource Locator (pURL) that permitted them to work on the survey as their time permitted and resume work where they left off, as often as necessary. Thirty-six of the 41 individuals who had been invited submitted responses to the pilot survey, and 34 of these were totally complete. A follow-up online survey administered afterward asked questions about participants' experience taking the pilot survey. The Practice Analysis Advisory Committee reviewed the findings of the pilot survey and made a small number of additional refinements to improve the survey.

Implementing the large-scale survey

All 6,857 CHTs whose hand therapy certification was current as of October 1, 2019, (the date the large-scale survey was launched) were invited to complete the survey. HTCC ran a full-page advertisement in the American Society of Hand Therapists (ASHT) Times print edition²⁰ announcing the survey. Scantron sent the invitation to participate followed by five reminder emails to CHTs who had not yet submitted their survey. To encourage participation, HTCC announced that one respondent would be selected at random to recertify without a fee (\$450 value). Additionally, five respondents were randomly selected to receive \$50 gift cards. Finally, HTCC sent a postcard reminder through the US Postal Service. Data were collected through October 31.

When the survey closed, Scantron staff downloaded the responses and, after performing data quality checks, prepared them for analysis. To be included in the analysis, participants had to have completed at least 90% of the survey; that is, if more than 43 ratings that had been requested were left blank, the entire response was excluded from the analysis. Given 127 invitations that bounced back to Scantron as undeliverable, the response rate was 34.4%.

The response rate for this study (34.4%) was substantially higher than the 2014 survey (29.1%) and is the highest response rate since the survey has been administered online. It represents a very good level of response for a lengthy online survey, and also represents the largest number of CHTs surveyed compared to previous hand therapy practice analyses. The sample size is robust and is comparable or higher to those obtained in other practice analysis studies of similar or related professions. The total number of respondents permits extrapolation of survey results to the larger population of hand therapists and provides a strong basis from which to make recommendations for the CHT credentialing program.

Analysis

Scantron computed descriptive statistics for each of the demographic questions in the survey. For all questions, this included the number of respondents selecting the option and the percentage of the total that corresponded to that number. When relevant, Scantron computed means, or averages, and standard deviations. To assess if the group of respondents represented the population of CHTs in a manner similar to previous surveys, Scantron reported the demographic findings from the 2019 respondents alongside those that had been reported for the survey in 2014, if the survey items permitted comparison.

Also, Scantron used coefficient alpha to compute and report internal consistency reliability for the Criticality and Frequency ratings for the domains, tools and techniques, and orthotic devices. For the Criticality and Frequency ratings collected for domains, tasks, knowledge areas, tools and techniques, and orthoses throughout the survey, Scantron computed the number and percent for each response option and scale unit as well as the number of respondents, the mean, standard deviation, and median response. These statistics were also computed for the questions addressing respondents' opinions about test specifications. In addition to the above, for the tools and techniques, Scantron further computed the number and percentage of Performance Expectation ratings that indicated the item was expected at entry-level (scale units of 2, 3, or 4) as well as the number and percentage that indicated otherwise (scale units of 1 or 5). Finally, several subgroup comparisons were reported.

The findings and analysis were compiled into a final report that was provided to HTCC for use in review of the HTCE requirements and policy decisions.

Results

Overall, the 2019 practice analysis study offers strong evidence of validity for the outline of the CHT's role and responsibilities as described by the domains and tasks, which are used to develop the HTCE. Internal consistency estimates using coefficient alpha may range from 0 to 1, with the closer to 1, the better. Acceptable levels of consistency for a professional study of this type are 0.70 and above⁹. For this study, all of the coefficients obtained were very strong, ranging from 0.85 to 0.94, indicating the data were solidly reliable.

Demographics

The great majority (86%) of respondents were OTs, and 13% were PTs. Less than 1% (0.5%) held both credentials. The ratio of OT to PT respondents is consistent with the overall ratio in the CHT population. The typical respondents were highly experienced, and on average, earned their initial OT or PT professional credential between 23 and 25 years ago. On average, they initially earned

the CHT credential almost 14 years ago, an increase of two years since the prior study. Respondents' mean age increased from 42 years in 2008, to 48.2 years in 2014, and to 48.6 years in the current study; and 27.7% are over 55 years of age. The youngest hand therapists are now 26 years old instead of 28 years old in the 2014 survey, due to the 2017 HTCC policy change that now allows certificants with three years (instead of five years) of OT or PT experience to become eligible to take the exam. The mean age of respondents has continued to rise, even with the addition of the new and younger cohort of therapists.

Responses to the survey questions showed little variation in practice patterns and responses between therapists who are early and those who are late in their careers.

Respondents were asked about their plans regarding their CHT status over the next five years. The vast majority of CHTs (95%) intend to renew their credential during the next five years while others will retire or go on inactive status. HTCC supports CHTs throughout the lifespan of their careers from initial certification through retirement.

Respondents tended to be female (84.2%), Non-Hispanic Caucasian (87.1%), and in the age range of 36–65 (83.5%), which is to be expected given the makeup of the underlying professions. There has been a small decrease in the Non-Hispanic Caucasian representation from 91.1% in 2008, but overall the specialty shows less diversity than the general population. The great majority of therapists were Non-Hispanic Caucasian (87.1%) and Asian or Asian American (6.9%). Each of the other groups represented less than 2% of the respondents.

Reviews of the practice analysis studies for occupational therapy and physical therapy show the parent professions may be slightly more diverse than the hand therapy specialty, with Caucasian practitioners at 80.1% for occupational therapy¹³ and 70–73% for physical therapy¹⁴.

Consistent with the 2014 study, this study invited all CHTs to participate, regardless of the country in which they practice. More than 90% were from the United States. Canada represented the next highest cohort (5%), followed by Australia (2.6%). All other countries represented 1% of the survey respondents.

Trends in entry-level education

Therapists continue to show an increase in their entry-level degree, consistent with trends in the underlying occupational therapy and physical therapy professions. A strong majority (68%) of the OT respondents still entered the field with a bachelor's degree, which is a reduction from 2014 (77%). Nearly 31% (30.9%) entered with a master's degree, and 1% entered the OT field with a doctorate, which increased from 20.9% and 0.3% respectively in 2014.

The responses to a question about the highest degree obtained in occupational therapy indicates that some respondents continued their OT education, with 36.5% obtaining a master's degree and 4.4% (up from 2.5%) achieving a clinical doctorate. A similar pattern is found for PTs, although a higher percentage of PTs entered with a master's degree (20.3%) or doctorate (11.5%), and a higher percentage of PTs have ultimately achieved a clinical doctorate (4.4% for OTs, 25% for PTs). These percentages show an overall increase in doctoral-level CHTs since the 2014 study, although the total numbers of CHTs with a clinical or research doctoral degree remain very small, estimated to be approximately 600 individuals.

Characteristics of Practice Settings and Hand Therapy Patients

Almost 60% of the respondents worked in a specialized hand surgery or hand therapy department or area. The next most common practice setting was general outpatient with mixed popula-

Table 1

Percentage of body regions that CHTs screen, treat or refer to other professionals

Body Region	Screen	Treat	Refer
Thoracic	27%	16%	44%
Cervical	49%	23%	63%
Shoulder Girdle	42%	72%	33%
Elbow	28%	88%	5%
Wrist	27%	89%	5%
Hand	27%	89%	5%

tions and diagnoses, followed by a general orthopedic clinic. The majority of patient referrals to respondents came from hand surgeons. Most respondents provided hand and upper limb therapy exclusively or nearly so.

In 2019, certificants were asked for the first time about the proximity of their clinical environment to a hand surgeon. More than half (53.6%) reported that they either share space with a hand surgeon (16%) or are located in the same building as a hand surgeon, while 46% reported that they had no close proximity to a hand surgeon.

This data was correlated with other questions to determine whether specific aspects of hand therapy practice are fundamentally affected by working in close proximity to a hand surgeon. The only significant difference noted was that therapists working in the same building as a hand surgeon made basic static orthoses on a daily basis, while therapists who were not located in the same building as a hand surgeon made basic static orthoses somewhat less frequently, but still on a weekly basis.

The time therapists spend in each domain was consistent with previous practice analyses. Respondents spent most of their time *Implementing the Plan of Care and Therapeutic Interventions*, though almost 30% of their time was spent in *Assessing Upper Quarter and Relevant Patient Characteristics*, and about 20% of their time in *Determining Prognoses and Individualized Plans of Care*.

Likewise, patterns of practice were consistent with previous studies. Respondents spend the greatest percentage of their work time (80%) providing direct patient care. Administration and management took the next largest percentage of time (6%), followed by clinical supervision or teaching (5%).

CHTs see patients of all ages, although the vast majority of patients were adults (53%) or older adults (nearly 33%). Specific diagnoses and conditions treated were not examined in this survey; they have remained very stable across previous practice analysis studies performed by HTCC.

The percent of direct patient care time spent in the various regions of the upper quadrant is very consistent with the 2008 and 2014 studies. The greatest amount of time was spent treating the hand (35.9%), followed by the wrist (31%), elbow (17.3%), shoulder girdle (16.6%), and cervical (6.1%). Certificants were asked about treatment of the thoracic spine for the first time in the 2019 survey and reported 3.6% of their time was spent in this region.

CHTs perform a variety of actions for their patients, including screening, treating, and referring to other professionals. [Table 1](#) shows the percentage of patients for which respondents performed each type of activity in the current study. Overall, CHTs treat most elbow (88%), wrist (89%), hand (89%), and shoulder girdle (72%) patients. There were no systemic differences between the 2008 and 2014 studies, with CHTs reporting referring 80% of cervical patients to other professionals.

Table 2
Descriptive statistics for frequency for domains

Domain	N	Mean	Median	SD
Assess Upper Quarter and Relevant Patient Characteristics	2,298	3.6	4	0.6
Determine Prognosis and Individualized Plan of Care	2,305	3.6	4	0.6
Implement Plan of Care and Therapeutic Interventions	2,307	3.9	4	0.4
Basic Sciences	2,273	3.7	4	0.6

1 = Never; 2 = Monthly or less; 3 = Weekly or almost weekly; 4 = Daily

Table 3
Descriptive statistics for criticality for domains

Domain	N	Mean	Median	SD
Assess Upper Quarter and Relevant Patient Characteristics	2,294	3.7	4	0.5
Determine Prognosis and Individualized Plan of Care	2,296	3.8	4	0.4
Implement Plan of Care and Therapeutic Interventions	2,298	3.9	4	0.3
Basic Sciences	2,292	3.7	4	0.5

1 = Not critical; 2 = Minimally critical; 3 = Moderately critical; 4 = Highly critical

Validation of the scope of practice

Respondents overwhelmingly validated the delineation of the domains (shown in Table 2), tasks, and knowledge required in hand therapy to treat patients with the identified diagnoses and conditions of the upper limb. All tasks within the domains achieved predetermined threshold levels for Frequency (at least *monthly to weekly*), Criticality (at least *moderately to highly critical*), or both. Participants used scales for Frequency and Criticality to evaluate (*i.e.*, provide a rating for) the tasks or knowledge areas in a domain, and then rated the domain as a whole. The Frequency ratings for the four domains, shown in Table 2, indicated that at least two-thirds of the respondents performed work in the domains on a daily basis, with the third domain, *Implement Plan of Care and Therapeutic Interventions*, being performed by more than 88% of the respondents on a daily basis.

The Frequency ratings were used to compute descriptive statistics about the domains. The findings summarized in Table 2 indicate that all are relevant to the hand therapist's practice on a daily basis, given the median. The mean indicated that duties related to *Implement Plan of Care and Therapeutic Interventions* were performed more often than the other domains.

Criticality and descriptive statistics for criticality ratings for domains are summarized in Table 3. The findings for Criticality were similar to those for Frequency, in that at least three-fourths of the respondents reported that the domains had high criticality, with the greatest percentage and highest mean obtained for *Implement Plan of Care and Therapeutic Interventions*. All four domains are seen as highly critical.

Overall, the tasks and knowledge areas within each domain received sufficiently high ratings for Frequency and Criticality. With two exceptions, the tasks and knowledge areas in *Assess Upper Quarter and Relevant Patient Characteristics* received high ratings for Criticality and Frequency. The exceptions were *reviewing the history of lab values for the patient* and *selecting and performing assessment of functional capacity and worksite*. Similarly, tasks in the *Determine Prognosis and Individualized Plan of Care* domain all were used frequently (at least weekly) and had at least moderate criticality except for *interpreting data to select prosthetics*, which was seen as not critical and occurred monthly or less often, perhaps even never. The findings for *interpreting data to select work conditioning and return-to-work programs* indicated that this task was performed less frequently than most, but more often than *selecting prosthetics*. Finally, the tasks in *Plan of Care and Therapeutic Interventions* listed a set of interventions that pertained to hand therapy practice. All but two of the interventions were used frequently, at

least weekly, if not more often. *Therapeutic exercise* was used most often, followed by *pain management* and *manual therapy*. *Prosthetics* and *work conditioning and return-to-work programs* were implemented less often, and prosthetics were viewed with less criticality.

Knowledge areas listed in the domain of *Basic Sciences* were evaluated using only the Criticality scale. All knowledge areas had at least moderate criticality except for *research design and statistics*, which was seen as having minimal to moderate criticality.

Tools and techniques used in hand therapy

The tools and techniques and their various elements used in hand therapy were evaluated using the Frequency, Criticality, and Performance Expectation scales. Altogether, ratings were collected on 62 items. In order to be included in the Scope of Practice of Certified Hand Therapists (and therefore included on the HTCE), the tools and techniques presented in Appendix 2 were required to meet at least one of the threshold criteria for Frequency (performed at least monthly to weekly) or Criticality (at least minimally critical). Some techniques achieved neither threshold. Respondents also rated the tools and techniques on Performance Expectation, identifying techniques and tools that a CHT can be expected to perform at the time of certification.

Although the large majority of tools and techniques and their elements are used often, there were 18 tools and techniques or elements that are used infrequently, if at all, with frequency scores less than monthly or never used. These techniques included: *continuous passive motion (CPM)*, *extracorporeal shockwave therapy*, *complementary medicine techniques*, *low-level laser therapy*, *dry needling*, *light therapy*, *cupping*, *shortwave diathermy*, *cervical traction*, *telehealth*, *cervical mobilization*, *use of crafts*, *thoracic mobilization*, *negative wound pressure therapy*, *whirlpool*, *3-D printing*, *physical agent modalities for wound care*, and *biofeedback*.

Most tools and techniques surveyed were moderately and highly critical. However, 21 of the tools and techniques or their elements had a median of 2 (*minimally critical*) or 1 (*not critical*). They included all of the interventions listed above, along with three others: *iontophoresis*, *strain-counterstrain*, and *contrast baths*.

Finally, respondents recorded their expectations about when proficiency in the tools and techniques or elements was expected using the Performance Expectation scale. These tools and techniques were divided into two groups and reported as a percentage. The first group indicated the entry-level nature of the tool or technique with the performance expected at the time of CHT certification. The second group included tools and techniques whose

Table 4
Frequency and criticality of orthotic tasks in domains of practice

Domain and Task	Frequency	Criticality
Domain 1: Assess the need for orthotic and/or prosthetic intervention	4	4
Domain 2: Interpret evaluation and assessment results considering complications and contraindications to select orthotic interventions	4	4
Domain 3: Implement and modify orthotic as a treatment intervention	4	4

Frequency: 1 = Never; 2 = Monthly or less; 3 = Weekly or almost weekly; 4 = Daily
Criticality: 1 = Not critical; 2 = Minimally critical; 3 = Moderately critical; 4 = Highly critical

performance was never expected of a CHT or that performance was expected only after CHT certification. For all but 10 of the tools and techniques, the percentage of respondents in the first group (who indicated the tool was entry-level) constituted a majority. The 10 constituting less than a majority included: *complementary medicine techniques, thoracic mobilization, dry needling, extracorporeal shockwave therapy, cupping, shortwave diathermy, cervical traction, negative wound pressure therapy (wound vac), cervical mobilization, and 3-D printing.*

Although the large majority of tools and techniques and their elements are used often and are critical elements in hand therapy, there were 17 tools and techniques or elements that are used infrequently, if at all, and were rated with low or no criticality. In addition, these skills are expected to either *never be developed* or if obtained, would be *post-initial certification* (not expected to be in place at the time of certification). Based on those criteria, these are not included on the HTCE at this time.

These techniques included: *CPM, extracorporeal shockwave therapy, complementary medicine techniques, low-level laser therapy, dry needling, light therapy, cupping, shortwave diathermy, cervical traction, telehealth, cervical mobilization, use of crafts, thoracic mobilization, negative wound pressure therapy, whirlpool, 3-D printing, and biofeedback.*

Use of orthoses in hand therapy

Detailed rating scales comprehensively explored the use of orthoses in hand therapy, as has been done previously with modalities (1985 and 2008)^{1,4} and wound care management (2014)⁵. These items were in addition to the previously included high-level tasks regarding the evaluation for and selection and implementation of orthoses under each domain in this and prior studies.

The study generated new information about the frequency and criticality of the use of specific types of orthoses in practice, as well as a performance expectation, which describes “when” in a hand therapist’s career they should have the knowledge and skill to implement this intervention. Therapists overwhelmingly validated these tools as moderately or highly critical to hand therapy practice and reported that therapists are generally expected to be proficient in these techniques upon initial certification as a hand therapist.

Each of the domains of practice (Assess Upper Limb and Relevant Patient Characteristics, Determine Prognosis and Individualized Plan of Care, and Implement Plan of Care and Therapeutic Interventions) include a task about orthoses, with results shown in Table 4.

As with tools and techniques, respondents used all three rating scales to assess orthoses in more detail. The orthoses and elements surveyed and scoring results are listed in Table 5. Of the 17 items related to custom-fabricated orthoses, *provide patient education for a custom orthosis* was reported to have the most frequent use, and *custom-fabricate basic static orthoses* was the second most common. Hand therapists *adjust or modify an existing custom orthosis* and *fabricate orthoses as an exercise device* more often than they fabricate static progressive or dynamic orthoses. Therapists custom fab-

ricate orthoses more often than fitting prefabricated orthoses. Several custom-fabricated orthoses and orthotic elements were rarely, if ever, used, especially the two that involved *3-D printing.*

Custom-fabricated orthotic techniques received even higher ratings for Criticality than Frequency, with almost all techniques surveyed rated as moderately or highly critical to hand therapy practice. Orthoses are clearly a significant part of each of the domains of hand therapy, used by hand therapists on a daily basis, and highly critical in the practice of hand therapy.

For prefabricated orthoses, the most frequent activity was to *provide patient education for a prefabricated orthosis*, followed by *custom fit prefabricated soft supports*. The data suggested it was unusual and not critical for CHTs to *custom-fabricate an orthosis as a temporary prosthesis* or to *refer patients to another therapy facility or to an orthotist* for a custom-fabricated orthosis.

Performance Expectation ratings were interpreted in a manner like those for tools and techniques, with the majority of respondents indicating the entry-level nature of the orthotic or orthotic element which indicated the knowledge and skill to implement these interventions expected at the time of CHT certification. The two items related to *3-D printing* were the exception.

The study also correlated the use of orthoses with proximity to a hand surgeon and found that therapists who share office space or are located in the same building as a hand surgeon fabricate custom basic static orthoses more frequently than those who have no proximity to a hand surgeon. Patterns of use of prefabricated orthoses were very consistent between the groups.

Emerging and receding trends in hand therapy

Overall, the results of the survey showed a high level of stability in the practice of hand therapy.

New additions to the survey, though not necessarily to practice, include *Activity Modification, Assess Accessory Motions, Assess Posture, Cupping, Dry Needling, Exercises for Proprioceptive training, Exercises for Stabilization, Functional Simulation, Thoracic Mobilization, Stress Loading, Telehealth, and 3-D printing.*

Activity Modification, Assess Accessory Motions, Assess/Posture, Exercises for Proprioceptive training, Exercises for Stabilization, Functional Simulation, and Stress Loading were validated by the survey as part of hand therapy practice, meeting the criteria for Frequency or Criticality, and in most cases both. The remaining items (*cupping, dry needling, thoracic mobilization, telehealth, and 3-D printing*) were not validated in the scope of hand therapy by the survey. They may be included in future studies to watch for changes in frequency or criticality.

Of the techniques and tools previously surveyed, the largest increase from prior studies, in both Frequency and Criticality, was noted for *Relaxation Techniques, Graded Motor Imagery, and Instrument Assisted Soft Tissue Mobilization*. Of those, *Relaxation Techniques* showed the largest increase, moving from monthly or less (1.7) to weekly/almost weekly (2.7). *Instrument Assisted Soft Tissue Mobilization* was used weekly by respondents.

The two new items surveyed in 2014 showed minimal change from that report. *Use of outcome measures* showed a small de-

Table 5
Orthoses and orthotic elements with criticality, frequency, and performance expectations

Orthoses and Orthotic Elements	Criticality	Frequency	Expected of CHT
Custom-fabricate basic static orthoses (e.g., finger, thumb spica, wrist support)	3.9	3.5	97.40%
Provide patient education for a custom orthosis (e.g., don/doff, wearing schedule, precautions)	3.9	3.5	96.90%
Custom-fabricate complex static orthoses (e.g., Muenster, airplane, long arm elbow/wrist)	3.7	2.6	84.80%
Custom-fabricate static progressive orthoses	3.6	2.6	86.40%
Custom-fabricate dynamic orthoses (e.g., MP extension, elbow flexion)	3.6	2.4	80.30%
Provide patient education for the prefabricated orthosis (e.g. don/doff, wearing schedule, precautions)	3.5	3.1	96.20%
Adjust/modify an existing custom-fabricated orthosis	3.5	3.1	88.10%
Custom-fabricate orthosis as an exercise device (e.g. MP block, relative motion)	3.5	2.7	89.20%
Adjust/modify an existing prefabricated orthosis	3.4	2.7	95.90%
Custom fit prefabricated soft supports (e.g., Neoprene thumb, buddy strap, digi sleeve)	3.3	2.9	96.20%
Custom fit prefabricated static orthoses (e.g., Stax, Oval-8, wrist)	3.3	2.7	95.90%
Custom fit prefabricated dynamic orthoses (e.g., LMB, hinged elbow)	3.3	2.5	93.80%
Custom-fabricate orthosis as a functional assist device	3.2	2.3	82.60%
Custom fit prefabricated static progressive orthosis	3.1	2.2	90.30%
Custom-fabricate casts for mobilization (e.g., elbow/hand contractures)	3.1	2.1	75.00%
Custom-fabricate playing casts (semi-rigid, removable) (e.g., sports, restrict motion)	2.9	2	71.40%
Custom-fabricate soft orthoses/supports (e.g., neoprene)	2.8	2	76.50%
Custom-fabricate casts for rigid immobilization (e.g., fiberglass or plaster)	2.8	1.9	71.90%
Custom-fabricate orthosis as a temporary prosthesis	2.5	1.6	54.70%
Send patients to a vendor for a prefabricated orthosis	2.4	1.7	82.70%
Send patients to an orthotist for a custom-fabricated orthosis	2	1.3	70.30%
Send patients to another therapy facility for a custom-fabricated orthosis	1.9	1.2	69.90%
Utilize 3-D printing to fabricate an orthosis	1.7	1	32.20%
Utilize 3-D printing to fabricate a prosthesis	1.6	1	31.40%

Frequency: 1 = Never; 2 = Monthly or less; 3 = Weekly or almost weekly; 4 = Daily

Criticality: 1 = Not critical; 2 = Minimally critical; 3 = Moderately critical; 4 = Highly critical

Expected of CHT: Percentage of CHTs who expect that CHTs should have knowledge and skill to perform the tool or technique

crease, now used weekly (3.3) instead of daily in hand therapy practice. However, CHTs still consider the *Use of outcome measures* to be moderately or highly critical (no change) to hand therapy practice. *Taping*, such as Kinesiotaping or McConnell taping, saw no change from the prior survey in frequency or criticality and is used weekly or almost weekly.

Of the techniques and tools previously surveyed, there were no clinically significant decreases in the frequency of use.

Previously reported reductions in frequency in *paraffin*, *whirlpool*, *topical medications for wound care*, *biofeedback*, and *CPM* saw no further reductions in this study.

Discussion

Hand therapy as a mature specialty

Over the past four decades, hand therapy has developed as a distinct and mature specialty of our parent professions of occupational therapy and physical therapy. Most of the underlying characteristics of hand therapists, the profession, and patients we treat have remained extremely stable, and this practice analysis underscores the maturity of the hand therapy profession.

There have been some changes to practice, but on the whole, the core of our work is unchanged. We provide *patient and family education*, *exercises for mobility*, *edema management*, *tendon gliding*, *soft tissue techniques*, *orthoses*, and *strengthening* on a nearly constant and universal basis to patients who have upper limb injuries or conditions that interfere with their normal activities of daily living.

Our demographic characteristics have remained very stable—the ratio of OTs to PTs, our workplace settings, our high level of experience, our referral sources, and the types of patients we treat. There have been steady but small changes in the number of international certifiants, our level of education, and the diversity of the workforce. Even the individuals who work in the profession are consistent, as characterized by the extremely high (95%) number

of therapists that renew their credential for each five-year cycle. Therapists tend to continue to work in the hand therapy specialty all the way to, or even into, their retirement years.

Hand therapy can be compared with other professions when evaluating its stage of development as a distinct specialty. External characteristics of a mature profession or specialty can include: a unique membership society or trade association, a specific professional publication, as well as a separate and robust credentialing process to defensibly establish criteria for the specialty and identify those individuals who meet them.²¹ Over the past 40 years, hand therapy in the United States has met each of these features, with the establishment of the American Society of Hand Therapists (1977), the *Journal of Hand Therapy* (1987), and the Certified Hand Therapist credential (1991) established by the Hand Therapy Certification Commission. Many other countries have hand therapy specific membership societies and professional publications to meet the needs of their practitioners.

The practice analysis process is a key component of describing the knowledge, skills, and abilities that define our unique professional specialty. The data that is generated from surveying all credentialed members in the field is used to establish the criteria for achieving and maintaining certification in hand therapy. The two most recent practice analyses have shown remarkable stability and cohesiveness in the practice of hand therapy. There are always a few emerging and receding trends, but overall the specialty has matured over time and become very stable, with a smaller number of new concepts or profoundly different variations of ideas within practice.

As a result of this scientific and data-driven process, HTCC believes that the use of the terminology of “upper limb” (which excludes the cervical and thoracic spine) instead of “upper quadrant” in the definition of hand therapy remains the most accurate representation of practice, as described in the 2008 analysis of practice.⁴ As a result, there were no specific HTCC policy changes or changes to the domains and knowledge area for the HTCE following this study.

Table 6
Assessment of frequency and criticality for inclusion on the HTCE

Item	Ratings	Decision
Dry needling	Criticality: minimal Frequency: low Performance Expectation: less than 20%	Not included on the HTCE
Temporary prosthesis	Criticality: minimal to moderate Frequency: low Performance Expectation: greater than 50%	Included on the HTCE
Basis static orthoses	Criticality: High Frequency: High Performance Expectation: Greater than 95%	Included on the HTCE

Validation of the definition and delineation of practice of hand therapy

Overall, the practice analysis study confirms that the Definition of Hand Therapy and the Scope of Practice of Certified Hand Therapists established by HTCC (Appendix 1), strongly and accurately reflects current hand therapy practice by CHTs. It also offers very strong evidence of validity for the outline of the hand therapist's role and responsibilities as described by the domains and tasks which are used to develop the HTCE.

Each item surveyed was evaluated for the criticality and frequency of the task that was reported by the respondents. In addition, tools and techniques (Appendix 2) and the items regarding the use of orthoses (Table 5) were rated on performance expectations; describing whether and when a CHT should be able to perform the tasks. The combination of this data was used to help identify which items should be included on the HTCE.

Some examples of this assessment and decisions are the following (Table 6):

Due consideration was given to the fact that a small number of tasks had insufficient support in the data to justify their inclusion in the examination. Likewise, the data suggested there are some tools and techniques as well as a few orthotic elements that should not be included in the examination at this time. There were no examples of items with low criticality that are used frequently.

The data strongly supported the blueprint and content for the HTCE.

Use of orthoses

Since the emergence of the specialty in the 1960s and 1970s, hand therapists have consistently used custom and prefabricated orthoses for their patients to immobilize or mobilize parts of the upper limb, reduce pain, promote healing or function, or apply a corrective force. Questions regarding the use of orthoses have consistently been included in all the prior studies of hand therapy practice and on the original HTCE in 1991.^{1,2,3,4,5} In fact, the initial practice analysis showed that the fabrication of orthoses was one of the top two treatment interventions that hand therapists used consistently on a daily basis¹.

The 2019 study expanded on prior questions and asked for more detailed information regarding specific types of custom and prefabricated orthoses used in hand therapy. The purpose of expanding the questions was to have a greater understanding of the extent to which orthoses are incorporated into clinical practice and direct patient care. The additional information clearly reflects the integral role orthoses play in managing upper limb medical conditions and surgeries.

It is clear from the study data that hand therapists continue to use custom and prefabricated orthoses on a daily basis as an in-

tegral part of a rehabilitation plan of care, and report that these items are highly critical to practice. In addition, therapists are expected to have sufficient knowledge and skills to implement these interventions by the time of initial certification as a hand therapist.

OTs and PTs receive referrals for orthoses from medical, osteopathic, and naturopathic doctors, chiropractors, orthotists, other therapists, physician assistants, nurse practitioners, case managers, rehabilitation nurses, athletic trainers, and other healthcare providers. Even prior to certification as a hand therapist, OTs and PTs provide orthotic interventions in hand therapy clinics, as well as in other settings, such as burn units and hospitals.

Therapists have specialty expertise, particularly in the use of low-temperature thermoplastic materials, to immediately fabricate and issue what the patient needs, without waiting for off-site fabrication. The initial critical window to reduce edema and pain and promote soft tissue or bony healing is within the initial three weeks following an injury or surgery, and the use of orthoses to protect or position the limb in this time frame is crucial to successful outcomes from sometimes devastating injuries.

In order to be most effective, custom and prefabricated orthoses require problem-solving, regular modification, and adjustment. In the context of a rehabilitation program, the patient can give and receive feedback and their response to the orthosis is monitored; further adjustment or changes are made when indicated. Therapists are uniquely qualified and positioned to ensure the effectiveness of the intervention since they have regular appointments with the patient.

HTCC recognizes that the use of orthoses is an integral part of the broader occupational therapy and physical therapy professions as a whole and is not unique to hand therapy. The initial training for the use of orthoses is provided in our entry-level education as an OT or PT. As with other technical and clinical skills, therapists further their education and knowledge of orthoses throughout their careers through clinical experience, dialogue with fellow therapists and physicians, and attending post-professional instructional courses.

The majority of hand therapists expect that a newly CHT has the fundamental skills to evaluate, select, fabricate, and dispense an orthosis, along with providing patient education. As with all of the skills tested on the HTCE, sufficient training, experience, and competence in this area are inferred by successful performance on the examination. Candidates demonstrate the knowledge and ability to identify the most appropriate orthotic intervention, to select appropriate materials and fabrication techniques, and to provide specific instructions for use. The application of orthotic principles is based on a foundational knowledge of anatomy, expected time frames for wound, bone, and tissue healing, and biomechanics and pathomechanics of the upper limb.

Based on the study data and our collective experience, the use of orthotic interventions is integral to the rehabilitation of patients with upper limb medical conditions, injuries, and surgeries. Hand therapists, in particular, possess the knowledge, expertise, and specialized skills in this critical area of clinical practice for the upper limb. The priority of all hand therapists is to provide the highest quality of care, in a cost-effective and time-specific manner, and the daily use of custom and prefabricated orthoses is a vital tool for achieving these objectives.

Emerging and receding trends

The practice analysis provides a snapshot of the hand therapy profession at a specific time and looks for changes in ratings for frequency and criticality of the tools and techniques used as part of hand therapy practice. Those aspects of practice that increase

in frequency or criticality are generally considered to be emerging trends, and those that decrease are considered to be receding.

The practice analysis process is repeated every five to seven years, and a new “snapshot” will capture different data at a future point in time. Items that are outliers in this survey may become more widely adopted in the intervening years, and some techniques will decrease in frequency or criticality. While data for certain items does not show sufficient frequency or criticality to be included in the blueprint at this time, the purpose of practice analysis is to identify whether and when a new technique reaches a widespread level of adoption and becomes a core part of practice. Some techniques emerge and stay peripheral, others emerge and are widely adopted by a majority of practitioners.

Supporting the description of the hand therapy specialty as relatively mature, the 2019 survey showed little substantial change in the characteristics of hand therapy patients and the tools and techniques used by hand therapists. Small increases in frequency were noted for *Relaxation techniques*, which increased in frequency from monthly or less to weekly/almost weekly. *Graded Motor Imagery* and *Instrument Assisted Soft Tissue Mobilization (IASTM)* continue to be used in hand therapy, and IASTM is used weekly/almost weekly by hand therapists. Pain management has been an important area of concern for healthcare professionals in the United States and globally, partially in response to the opioid crisis, and both *Relaxation technique* and *Graded Motor Imagery* are skills that a hand therapist can apply.

The items that were added to the survey, but not validated as widely used in the practice of hand therapy, included *cupping*, *dry needling*, *thoracic mobilization*, *telehealth*, and *3-D printing*. The authors note that *3-D printing* is becoming more widely available, cheaper, and faster, and is finding its place in the provision of therapy-related items such as orthoses and adaptive equipment/aides.²² However, the practice analysis shows that, at this time, *3-D printing* and the other techniques have not yet become a standard of care within the hand therapy specialty. Hand therapists report to HTCC that they are taking courses in *dry needling*, but it has not reached widespread adoption within the specialty at this time. The HTCE focuses on treatment techniques that are unique to the hand therapy specialty, and at this time, neither *telehealth* nor *3-D printing* fit that description, so these areas would not be included as test items on the examination at this time.

The use of *Telehealth* deserves special mention. It is important to note that this survey was completed shortly before the global COVID-19 pandemic. Respondents rated the frequency of the use of telehealth as almost never (1.2) and the criticality as minimally critical (1.7). It is expected that those numbers would increase if the survey were repeated now, and they may be higher in the future.

Conclusions

This large-scale study added new information regarding the specific details of the use of orthoses in hand therapy. Hand therapists have consistently and traditionally used custom and prefabricated orthoses to protect, support, align, or mobilize parts of the upper limb. The use of orthoses in hand therapy is not an isolated, standalone, technical skill, but is thoroughly integrated into the evaluation and treatment of hand therapy patients. No other profession has the specific knowledge of anatomy and the progression of the rehabilitation process and has the ability to provide the right solution at the right time for these patients.

This study provides descriptive details about the practice of hand therapy that validate the test blueprint for the HTCE. It highlights that the specialty of hand therapy is a mature and stable specialty field of occupational therapy and physical therapy. The

strength of the data shown in this study establishes a very strong basis for the content validity of the examination, demonstrating convincingly that the HTCE accurately represents the actual practice of hand therapy.

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Authors

Appendix 1. Scope of Practice of Hand Therapy

Definition of Hand Therapy and Scope of Practice of Certified Hand Therapists

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Definition of Hand Therapy:

Hand therapy is the art and science of rehabilitation of the upper limb, which includes the hand, wrist, elbow, and shoulder girdle. It is a merging of occupational therapy and physical therapy theory and practice that combines comprehensive knowledge of the structure of the upper limb with function and activity. Using specialized skills in assessment, planning, and treatment, hand therapists provide therapeutic interventions to prevent dysfunction, restore function, or reverse the progression of pathology of the upper limb in order to enhance an individual's ability to execute tasks and to participate fully in life situations.

Certified Hand Therapists:

Hand therapists are certified or licensed occupational therapists or physical therapists who, through advanced education, clinical experience, and independent study have become proficient in the treatment of pathological upper limb conditions resulting from trauma, disease or congenital or acquired deformity. A Certified Hand Therapist (CHT) is an occupational therapist or physical therapist who has passed a rigorous examination and met the standards established by the Hand therapy Certification Commission, Inc. (HTCC).

Scope of Practice and Domains of Hand Therapy:

The *Scope of Practice of Hand Therapy* includes the domains described below. Domains describe major areas of responsibility in hand therapy. The first three domains include assessment and treatment of hand therapy patients. In compliance with state and federal law, treatment is based on the results of assessment and may be provided on a one-to-one basis, in a group, or by consultation. The fourth domain includes knowledge areas that serve as a foundation for the other domains in practice. Hand therapy practice domains and their associated tasks are listed below.

DOMAINS OF HAND THERAPY PRACTICE

- 1 Assess Upper Limb and Relevant Patient Characteristics

- 2 Determine Prognosis and Individualized Plan of Care
- 3 Implement Plan of Care and Therapeutic Interventions
- 4 Basic Science and Fundamental Knowledge

Domain 1: Assess Upper Limb and Relevant Patient Characteristics

- Review medical, surgical, pharmacologic, imaging, neurodiagnostic history and co-morbidities.
- Conduct patient, family, and caregiver interviews pertaining to hand therapy needs.
- Perform an upper limb screen and systems review.
- Select, perform and interpret assessment of: accessory motions, activities of daily living, dexterity and coordination, edema and swelling, function, functional capacity and work site, muscle function, pain, patient-reported outcomes, posture, joint range of motion, sensibility, special signs and tests of the upper extremity, strength, sympathetic status, tightness, vascular status, and wounds.
- Interpret examination findings based on basic science, fundamental knowledge, and knowledge of conditions of the upper limb to diagnose, validate the diagnosis, and to consider differential diagnosis.
- Assess the need for orthotic or prosthetic intervention.
- Identify complications associated with medical condition(s).

Domain 2: Determine Prognosis and Individualized Plan of Care

- Determine prognosis, rehabilitation potential, and expected functional outcomes and timeframe based on condition, medical, or surgical management and planned interventions.
- Establish goals specific to the assessment.
- Interpret data considering complications and contraindications to select interventions for the patient: adaptive and assistive devices, edema management, ergonomics, joint protection and energy conservation, manual therapy, modalities, neuromuscular reeducation, orthotics, pain management, posture and positioning, prosthetics, scar management, self-care and home management, sensory re-education and desensitization, therapeutic activity, therapeutic exercise, work conditioning and return-to-work programs, wound care and management.
- Establish an individualized plan of care based on hand and upper extremity treatment guidelines and medical or surgical management by integrating basic science, fundamental knowledge, best clinical evidence, clinical experience, and patient goals.
- Recognize the need to consult with or refer to other health care professionals.
- Modify the plan of care based on reassessment, outcomes, and patient characteristics.
- Formulate a recommendation about readiness to return to life or work activities and for discharge.

Domain 3: Implement Plan of Care and Therapeutic Interventions

Implement and modify therapeutic interventions, including, but not limited to adaptive and assistive devices, edema management, ergonomics, joint protection and energy conservation, manual therapy, modalities, neuromuscular reeducation, orthotics, pain management, posture and positioning, prosthetics, scar management, self-care and home management, sensory re-education and desensitization, therapeutic activity, therapeutic exercise, work conditioning and return-to-work programs, and wound care and management.

Domain 4: Basic Science and Fundamental Knowledge

- The foundation of the practice of hand therapy is comprehensive understanding of:
 - Surface anatomy of the upper limb

- Anatomy and physiology of connective tissue and the integumentary, skeletal, muscular, nervous, vascular, and lymphatic systems
- Age-specific upper limb function
- Kinesiology and biomechanics relative to the upper limb
- Pathomechanics and pathophysiology relative to the upper limb
- Etiology and pathology of medical conditions that may manifest with signs or symptoms in the hand or upper limb
- Histology of bone and soft tissue healing and repair
- Physiology and psychology of pain
- Properties of heat, water, light, electricity, and sound as they apply to physical agent modalities and electrodiagnostic tools
- Psychological reactions to impairment
- Research design and statistics
- Principles of evidence-based practice
- Physical properties of orthotic and prosthetic materials
- Knowledge areas related to *assess, plan, and implement* domains require comprehensive understanding of:
 - Communication techniques and principles
 - Posture and its effects on the upper limb
 - Differential diagnosis
 - Surgical, non-surgical, and medical management of conditions of the hand or upper limb including expected outcomes and complications
 - Post-surgical, non-surgical, medical and therapeutic intervention guidelines and protocols
 - Assessment tools, tests, and measures and their psychometric properties
 - Pharmacology as it relates to the scope of hand therapy practice
 - Diagnostic imaging of the upper limb
 - Electrodiagnostics of the upper limb
 - Anticipated outcomes of medical and/or therapeutic intervention
 - Anticipated physiological and psychological effects of therapeutic interventions
 - Rationale, indications, precautions, and contraindications for interventions
 - Therapeutic interventions (methods, techniques and tools)
 - Concepts and principles of orthotic devices, prosthetic devices, and ergonomics

Treatment Techniques and Tools used in Hand Therapy

A variety of techniques and tools may be used for therapeutic intervention with hand and upper limb patients, including, but not limited to adaptive and assistive devices, desensitization, edema management, ergonomic modification, joint protection, lymphedema management, manual therapy techniques, physical agent modalities, biofeedback, neuromuscular re-education, custom and prefabricated orthoses and prosthetics, patient education, pain management, posture awareness and modification, sensory re-education, telehealth, taping, therapeutic activity, therapeutic exercise, work conditioning and return-to-work programs, and wound care and scar management.

Conditions of Hand and Upper Limb Patients

Theoretical knowledge and technical skills are applied, using good clinical judgment, in assessment and treatment of individuals with diagnoses related to the upper limb (hand, wrist, elbow, shoulder girdle, cervical area or multiple joints). Diagnoses may include adhesions or tightness, amputations, arthritis and rheumatic diseases, congenital anomalies or differences, crush injuries and mutilating trauma, cumulative trauma disorders, cysts and tumors, developmental disabilities, dislocations and subluxations, Dupuytren's Disease, edema, factitious disorders, fractures,

infections, ligamentous injury and instability, lymphedema, muscular injuries, nerve injuries and conditions, neuromuscular diseases, pain, replantation and revascularization, spinal cord and central nervous system injuries, tendon injuries and conditions, thermal and electrical injuries, vascular disorders, and wounds and scars.

Such patients may be referred to a hand therapist following a variety of medical or surgical interventions including amputation, arthrodesis, arthroplasty and joint replacement, fasciotomy and fasciotomy, fracture fixation and bone graft, ganglionectomy, injection, ligament repair and reconstruction, nailed repair, nerve block and sympathectomy, nerve decompression, nerve repair, nerve graft, nerve transfer, replantation and re-vascularization, scar release and revision; skin graft and flap, synovectomy, tenosynovectomy, tenovagotomy, tendon repair and graft, tendon transfer, tenolysis, and use of pharmaceutical agents.

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Appendix 2. Tools and Techniques with Criticality, Frequency, and Performance Expectations

Tools and Techniques	Criticality	Frequency	Expected of CHT
Tendon gliding	3.9	3.8	97.90%
Patient, family, and caregiver education	3.9	3.8	97.80%
Strengthening	3.9	3.9	97.60%
Mobility (e.g., active, passive ROM)	3.9	4	97.60%
Edema management	3.8	3.8	98.10%
Scar management	3.8	3.7	95.90%
Soft tissue techniques	3.8	3.8	94.00%
Dexterity and coordination	3.7	3.7	97.80%
Joint mobilization	3.7	3.7	90.10%
Desensitization	3.6	3.4	98.20%
Activity modification	3.6	3.6	96.90%
Stabilization	3.6	3.5	96.60%
Neural mobilization	3.6	3.4	92.70%
Endurance	3.5	3.5	98.20%
Joint protection	3.5	3.3	97.80%
Sensory re-education	3.5	3.3	97.30%
Neuromuscular re-education	3.5	3.4	95.70%
Proprioceptive training	3.5	3.3	95.50%
Posture awareness, modification, and adjustment	3.4	3.3	96.90%
Selection and application of dressings	3.4	2.8	88.00%
Thermal/heat	3.3	3.6	98.40%
Functional simulation	3.3	3.1	93.80%
Cleansing	3.3	2.8	90.20%
Debridement	3.3	2.6	81.30%
Ergonomic modification	3.2	2.9	93.60%
Adaptive and assistive devices	3.1	2.8	97.40%
Relaxation techniques	3	2.7	94.60%
Graded motor imagery (e.g., laterality training, imagery, mirror therapy)	3	2.5	90.50%
Work conditioning and return-to-work programs	3	2.3	86.90%
Suture or staple removal	3	2.4	83.50%
Mobilization with movement	3	3	72.70%
Cryotherapy	2.9	2.9	97.40%
Ultrasound/phonophoresis	2.9	3.2	96.10%
Stress loading	2.9	2.6	93.50%
Taping	2.9	2.9	89.80%
Instrument assisted soft tissue mobilization	2.9	2.9	68.50%
Lymphedema management	2.9	2.2	52.40%
Electrical stimulation	2.8	2.7	96.00%
Application of topical medications	2.8	2.3	82.90%
Paraffin	2.7	2.8	97.00%
Fluidotherapy	2.7	2.8	94.70%
Iontophoresis	2.4	2.2	91.00%

(continued on next page)

Tools and Techniques	Criticality	Frequency	Expected of CHT
Physical agent modalities for wound care	2.4	1.9	65.90%
Strain-counterstrain	2.4	2.2	64.80%
Contrast baths	2.3	2.1	94.10%
Biofeedback	2	1.5	80.30%
Thoracic mobilization	2	1.5	38.40%
Use of crafts	1.9	1.7	82.10%
Continuous Passive Motion (CPM)	1.9	1.5	79.60%
Complementary medicine techniques (e.g. acupuncture, Pilates, Yoga, Feldenkrais)	1.9	1.7	49.50%
Negative wound pressure therapy (wound VAC)	1.9	1.2	42.70%
Cervical mobilization	1.9	1.4	32.40%
Whirlpool	1.8	1.4	79.40%
Cervical traction	1.8	1.3	32.40%
Telehealth (e.g., video conference consultation)	1.7	1.2	57.00%
Cupping	1.7	1.5	31.20%
Low-level laser therapy	1.6	1.4	56.60%
Dry needling	1.6	1.2	17.70%
3-D printing	1.5	1	36.50%
Light therapy	1.4	1.2	51.10%
Shortwave diathermy	1.3	1.1	44.10%
Extracorporeal shockwave therapy	1.3	1.1	38.80%

Frequency - 1 = Never; 2 = Monthly or less; 3 = Weekly or almost weekly; 4 = Daily

Criticality - 1 = Not critical; 2 = Minimally critical; 3 = Moderately critical; 4 = Highly critical

Expected of CHT - Percentage of CHTs who expect that CHTs should have knowledge and skill to perform the tool or technique.

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JHT Read for Credit

Quiz: # 893

Record your answers on the Return Answer Form found on the tear-out coupon at the back of this issue or to complete online and use a credit card, go to JHTReadforCredit.com. There is only one best answer for each question.

- # 1. A primary purpose of the HTCC's practice analysis is to assure that
 - a. continuing Ed credits reflect the content of the HTCE
 - b. OTs and PTs pass the HTCE CHT in equal numbers
 - c. the HTCE passing score is equitable across cultures
 - d. the HTCE accurately reflects current practices
- # 2. In this article the HTCC was especially focused on the utilization of _____ in the day-to-day practice of hand therapy
 - a. physical agent modalities
 - b. manual therapy
 - c. orthotics
 - d. home exercise programs
- # 3. The survey went out to
 - a. CHTs around the world
 - b. ASHT members
 - c. APTA and AOTA members
 - d. 40 content experts

- # 4. Orthotic fabrication and application are considered by CHTs to be
 - a. often encountered tasks
 - b. highly critical tasks
 - c. the domain of OTs more so than of PTs
 - d. an overused and overpriced intervention
- # 5. Content validity was shown for the HTCE
 - a. false
 - b. true

When submitting to the HTCC for re-certification, please batch your JHT RFC certificates in groups of 3 or more to get full credit.