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2008 Practice Analysis Study of Hand Therapy

Mary P. Dimick, OTR/L, CHT

Hand Therapy Certification Commission, Sacramento, California

Carla M. Caro, MA

Professional Examination Service, New York, New York

Mary C. Kasch, OTR/L, CHT, FAOTA

Hand Therapy Certification Commission, Sacramento, California

Patricia M. Muenzen, MA

Professional Examination Service

Lynnlee Fullenwider, OTR/L, CHT

Patricia A. Taylor, PT, CHT

Keri Landrieu, LOTR, CHT

J. Martin Walsh, OTR/L, CHT

Hand Therapy Certification Commission, Sacramento, California

ABSTRACT: In 2008, the Hand Therapy Certification Commission (HTCC), in consultation with Professional Examination Service, performed a practice analysis study of hand therapy, the fourth in a series of similar studies performed by HTCC over a 23-year period. An updated profile of the domains, tasks, knowledge, and techniques and tools used in hand therapy practice was developed by subject-matter experts representing a broad range of experiences and perspectives. A large-scale online survey of hand therapists from the United States, Canada, Australia, and New Zealand overwhelmingly validated this profile. Additionally, trends in hand therapy practice and education were explored and compared with the previous studies. The results led to the revision of the test specifications for the Hand Therapy Certification Examination; permitted refinement of the definition and scope of hand therapy; identified professional development and continuing education opportunities; and guided HTCC policy decisions regarding exam and recertification eligibility requirements.

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BACKGROUND

Hand Therapy certification is a voluntary credentialing program established in 1989 by the Hand Therapy Certification Commission (HTCC) to certify occupational therapists (OTs) and physical therapists (PTs) in the advanced clinical specialty of rehabilitation of the upper limb. A certified hand therapist (CHT) is an OT or PT who has a minimum of five years of clinical experience, including 4,000 hours or more in direct practice in hand therapy, and who has successfully completed the comprehensive Hand Therapy Certification Examination (HTCE), which is a test of

advanced clinical skills and theory in upper extremity rehabilitation.

The examination covers the broad knowledge required for clinical intervention as well as the basic science and theory that support clinical treatment. Certification is granted for a five-year period, at which time a therapist must recertify by examination or by accruing hours of work experience and professional development. HTCC provides a recertification program to continue to ensure that individuals maintain clinical competence once they have been certified initially.

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 2008, HTCC in consultation with Professional Examination Service (PES) performed the fourth in a series of practice analysis studies that have been conducted by HTCC over a 23-year period. Previous studies were completed in 1985,¹ 1994,² and 2001.³ In professional credentialing, the primary purpose of conducting a practice analysis was to create a valid

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Correspondence and reprint requests to Mary C. Kasch, OTR/L, CHT, FAOTA, Hand Therapy Certification Commission, 1337 Howe Avenue, STE 230, Sacramento, CA 95825; e-mail: <mkasch@htcc.org>.

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and defensible empirical foundation for examination development. As had been the case in previous years, the primary rationale for performing the study was to ensure that the test content outline for the HTCE reflects the critical tasks, knowledge, and skills required in professional practice. Additional goals of the study were to explore trends in hand therapy education, to identify developmental needs and areas for professional education, and to permit refinement of the definition and scope of hand therapy that had been established on the basis of the original role delineation study in 1985 and revised in 2001.

METHODS

Update of Description of Hand Therapy Practice

A Practice Analysis Advisory Panel (PAAP), made up of therapists who had participated in previous practice analysis studies, provided strategic planning and oversight during the course of the study. The PAAP appointed a Practice Analysis Task Force (PATF) to update the 2001 delineation of hand therapy practice. PATF members included CHTs who reflected the diversity of hand therapy practice, represented various employment settings and areas of expertise, who were familiar with the CHT exam program (including present and former members of the exam committee), or were OT or PT educators. The PAAP also selected subject-matter experts (SMEs) to participate in telephone interviews, to be members of the independent review panel, and to act as pilot testers of the validation survey. These SMEs were also chosen to reflect a broad range of experiences and perspectives in hand therapy practice.

Preliminary Data Collection with SMEs

In preparation for the work of the PATF, a series of telephone interviews was conducted with 12 SMEs. The interviews focused on changes in practice over the past five years and asked for recommendations for updating the present CHT examination outline. The changes in practice most frequently cited were increased reliance on evidence-based practice and on a medical model of practice; the need for more practical skills training and foundational knowledge acquisition in education programs; increasing demands from insurance companies for accelerated treatment and more home programs; and increasing insurance company requirements for documentation.

PATF Meeting

The PATF met to review and update the 2001 description of hand therapy practice. The description

included the major domains of practice, the tasks performed by hand therapists, the scientific knowledge underlying practice, the diagnoses and conditions presented by patients, and the techniques and tools used by hand therapists. The PATF members also considered the screening, assessment, and treatment activities performed by therapists in the different regions of the upper extremity. At the meeting, in addition to updating the elements of the practice description, the domains of hand therapy were restructured: a new domain, *Basic Science and Fundamental Knowledge* was added; the domain *Provide Population-Based Services* was deleted; two former domains (*Organize and Manage Services* and *Promote Professional Practice*) were combined to form a *Professional Practice* domain; and three domains remained unchanged. [Exhibit 1](#) presents the revised domains of hand therapy.

Conduct of Independent Review

An external review of the draft delineation with 14 independent SMEs was completed to ensure that the delineation was clear, comprehensive, and reflective of present practice. The PAAP met to consider the comments and suggestions made by these reviewers to determine what to incorporate into the final delineation of practice.

Validation of Delineation of Practice

A large-scale online survey was conducted to validate the finalized description of practice. The survey was pilot tested by a group of 25 CHTs. In addition to responding to the survey elements, participants answered a series of questions about the clarity of survey instructions, the ease of use of the survey instrument, the time taken to complete the survey, and whether any tasks, knowledge, diagnoses and conditions, or techniques and tools used by hand therapists were missing from the survey. On the basis of their feedback, the PAAP made further refinements and revisions to the delineation of practice to be validated in the online survey.

Sampling Plan

The practice analysis called for sampling 1,750 CHTs from the United States, and the entire population of CHTs in Canada, Australia, and New Zealand. A stratified random sample was drawn from the HTCC database of all practicing CHTs in the United States. The plan oversampled less-experienced CHTs to ensure a sufficient number of responses from which to draw conclusions when comparing the responses of more- and less-experienced respondents. Random sampling within experience levels yielded a sample size of 1,138 less-experienced CHTs (5 or less years since

EXHIBIT 1. Domains of Hand Therapy

Basic science and fundamental knowledge

Understand and apply knowledge of the theory and principles of anatomy, physiology, kinesiology, and biomechanics as they relate to the upper extremity; understand physical properties and expected outcomes of treatment interventions; understand the etiology, pathology, and surgical and medical treatments of conditions affecting the upper extremity.

Evaluate upper extremity and relevant patient characteristics

Perform and document all aspects of patient evaluation, including interviews and assessments.

Determine prognosis and plan of care

Based on the results of the evaluation, determine treatment interventions and expected outcomes. Plan discharge based on progress toward goals.

Implement therapeutic interventions

Apply and modify therapeutic interventions, including patient education and home programs.

Professional practice

Provide ethical, safe, and fiscally responsible practice; manage human resources; use evidence-based practice; interpret and apply research; promote ongoing professional development for self and others; and advocate for patients and the profession.

becoming a CHT) and 612 more-experienced CHTs (6 or more years since becoming a CHT). In addition, the entire population of 146 Canadian CHTs, 54 Australian CHTs, and three New Zealand CHTs was surveyed. Because one goal of the practice analysis was to compare CHTs to non-CHTs, HTCC obtained the membership list of the American Society of Hand Therapists, and randomly sampled 446 members of that organization who were not CHTs for inclusion in the survey.

Survey Versions

To reduce demands on survey respondents, two versions of the survey were developed. Both versions included questions about the domains and tasks of hand therapy. Tasks were rated on the frequency with which they were performed and their criticality to optimizing patient outcomes. All respondents were asked about the percentage of time they spent in the direct patient care domains (which excluded the scientific knowledge domain and the professional practice domain), and about the extent to which they screened, treated, or referred patients presenting conditions related to different regions of the upper extremity. All respondents were asked what percentage of the CHT exam should focus on each of the five domains. The respondents were then randomly assigned to one of two versions for the next section of the survey.

In *Version A* of the survey, the respondents were asked to rate the knowledge underlying hand therapy on three scales: the point at which they *had* acquired the knowledge (during formal education, before specialization in hand therapy, during the first two years of hand therapy practice, or after

two years of hand therapy practice); the point at which a hand therapist *should* acquire the knowledge (using the same scale); and the means by which they acquired the knowledge (basic OT/PT training, on-the-job training, or continuing education). *Version A* also asked the respondents to indicate the percentage of their patient populations that fell within each of the 26 diagnostic categories or conditions, using predetermined percentage ranges.

Version B of the survey asked the respondents to rate 107 techniques or tools used by hand therapists on three scales: the frequency with which they used the technique or tools during the past year; the criticality of the technique or tool to optimizing patient outcomes; and the point at which a hand therapist should be able to use the technique or tool.

Finally, both versions of the survey asked questions about percent of time spent in direct patient care, extent of screening, treatment and referral activities performed with patients in each region of the upper extremity, characteristics of patient caseload, and a series of questions about the respondent's professional and demographic background.

Survey Dissemination

PES disseminated an electronic invitation to participate in the survey to 2,399 individuals (1,953 CHTs and 446 non-CHTs). The invitation contained an individualized password-protected link to the survey. Two weeks later, a reminder email was sent to those who had not yet completed the survey. One week later, final email reminders were sent, one version to those who had not yet opened the survey,

and a second version tailored to those who had partially completed the survey.

RESULTS

Characteristics of Hand Therapists and Their Patients

The survey response rate of CHTs was 35%, whereas that of non-CHT hand therapists was 17%, for an overall response rate of 32%. International CHTs (from Canada, Australia, and New Zealand) responded at a higher rate (47%) than did those from the United States (34%). Consistent with the fact that *Version A* required fewer ratings than did *Version B*, more of the completed surveys were *Version A* than *Version B* (52% and 48%, respectively). Although this response rate was lower than those achieved in the 2001, 1994, and 1985 studies, it is still very robust and is comparable or higher to those obtained in other practice analysis studies of similar or related professions. The sample size and response rate permit extrapolation of survey results to the larger population of hand therapists.

The proportion of the respondents holding the two professional degrees required for CHT certification differed by country. Of the 661 respondents from the United States, 89% were OTs and 11% were PTs; of the 73 respondents from Canada, 51% were OTs, 47% were PTs, and 3% were dually credentialed. The ratio of OTs and PTs was consistent with the overall ratio of OTs (85%) to PTs (15%) in the CHT population. The only notable difference was in Canada, where the ratio was more evenly split. This finding was consistent with the 2001 study.

The respondents' mean age was 42 years. A larger proportion of OTs were less experienced, with 62% of OTs having one to five years experience as a CHT, whereas 51% of PTs had one to five years of CHT experience. Most of the respondents reported that their entry level of education as an OT was a Bachelor's degree. Although the numbers were small, there appeared to be a trend in PT to enter the profession with a more advanced degree. Given the average length of practice of the respondents (16–18 years), the survey does not reflect that both professions now require entry with an advanced degree.

Most of the hand therapists belonged to their national hand therapy association (e.g., the American Society of Hand Therapists) whether or not they were CHTs; however, a much smaller percentage (15–35%) belonged to their national OT or PT organization. About half belonged to their local OT or PT association or chapter. Many respondents held certification in other specialties, with the highest percentage as Certified Functional Capacity Evaluator (22%), Certified Manual Lymphedema Therapist (20%), and

Certified Ergonomic Assessment Specialist (16%). The CHTs tended to have additional certification more frequently than non-CHTs.

Patterns of practice were consistent with previous studies. The CHTs maintained a caseload of 50% or more upper extremity patients for an average of three years longer than non-CHTs, and more than 90% of the caseload of both consisted of upper extremity patients. Most of both CHTs and non-CHTs were staff therapists, with more non-CHTs employed in this position than CHTs. Slightly more CHTs were clinical supervisors or managers. Therapists continued to work primarily in hospital-based practices (46%), with a slight decrease working in corporate-owned practices (8% compared with 17% in 2001) and an increase in physician-owned practices (15% compared with 11%). Only one person who completed the survey was characterized as a researcher, as compared with 1% of the respondents in 2001 and 7% in 1994.

The diagnoses or conditions presented by the respondents' patient populations are shown in [Table 1](#). Each cell presents the percent of survey respondents who reported that "X" percent of their patients presented with the diagnosis or condition, "X" being the predetermined range listed in the top row (e.g., 23% of the respondents reported that between 26% and 50% of their patients presented with *edema*; 14% of the respondents reported that between 1% and 10% of their patients presented with *adhesions or tightness*). The final highlighted column shows that the combined percent where more than half of the patients presented with the diagnosis or condition, and is organized in rank order. The diagnostic list was considerably longer in the 2008 survey than in the 2001 survey; therefore, the results cannot be compared directly with previous surveys: *edema*; *adhesions and tightness*; *wounds and scars*; *muscle strains, tears and avulsions*; and *crush injuries/mutilating trauma* were added to the list as distinct conditions in 2008 and were ranked first, third, fourth, seventh, and tenth, respectively. The other "top 10" conditions were consistent with previous studies.

The respondents reported that 93% of their direct patient care caseload comprised upper extremity patients. [Table 2](#) shows the percent of time spent in and criticality of the direct patient care domains, and compares this to the results found in the 2001 study. The percentages of time spent in each domain are roughly comparable, with slightly less time spent in the present study on tasks related to the *Implement Therapeutic Interventions* domain and slightly more time spent in the other two direct patient care domains. There was somewhat more variation within the percent of time allocations in the 2008 study. Criticality ratings were slightly lower in the present study, again with greater variability in responses.

TABLE 1. Percent of Patients with Diagnosis or Condition

<i>Diagnosis/Condition</i>	0%	1–10%	11–25%	26–50%	51–75%	76–100%	>50%
Edema	0%	6%	13%	23%	34%	23%	57%
Fractures	1%	3%	13%	36%	33%	14%	47%
Adhesions or tightness (e.g., musculotendinitis, capsular)	0%	14%	19%	29%	28%	10%	38%
Wounds and scars	1%	13%	26%	24%	23%	12%	36%
Cumulative trauma disorders	1%	14%	22%	36%	20%	7%	26%
Tendon injuries and conditions (e.g., lacerations, transfers, tendonitis, ruptures)	1%	11%	34%	32%	16%	6%	22%
Muscular strains, tears, and avulsions	2%	16%	34%	30%	14%	5%	19%
Nerve injuries and conditions (e.g., neuropathies, palsies, nerve repairs)	0%	14%	37%	35%	11%	3%	14%
Ligamentous injury and instability	1%	17%	39%	29%	13%	2%	14%
Crush injuries/mutilating trauma	2%	30%	35%	20%	11%	2%	12%
Dislocations and subluxations	2%	33%	39%	19%	6%	1%	7%
Pain (e.g., complex regional pain syndrome, fibromyalgia)	3%	54%	29%	7%	4%	3%	7%
Arthritis and rheumatic diseases	0%	31%	37%	25%	6%	1%	7%
Dupuytren's disease	3%	52%	31%	11%	3%	0%	3%
Factitious disorders	33%	52%	9%	3%	2%	0%	3%
Infections	6%	56%	26%	10%	2%	1%	3%
Amputations	9%	64%	21%	5%	1%	1%	2%
Cysts and tumors	10%	62%	20%	7%	1%	0%	1%
Replantation and revascularization	25%	59%	13%	2%	1%	0%	1%
Developmental disabilities	64%	34%	1%	1%	1%	1%	1%
Thermal and electrical injuries	29%	59%	10%	1%	1%	0%	1%
Lymphedema	41%	47%	10%	2%	1%	0%	1%
Neuromuscular diseases—ALS, MS, MD	42%	52%	5%	0%	0%	0%	0%
Vascular disorders	22%	62%	13%	3%	0%	0%	0%
Congenital anomalies/differences	40%	55%	4%	1%	0%	0%	0%
Spinal cord and central nervous system injuries	52%	44%	3%	1%	0%	0%	0%

The respondents also rated the tasks performed within each domain on frequency and criticality scales. The most frequently performed tasks were *Implement/apply and modify the therapeutic interventions, Maintain ethical standards, and Document services provided*. The least frequently performed tasks were *Participate in clinical research, Develop and implement educational programs for professionals, and Manage human resources*. In general, the frequency ratings of certified and non-certified respondents were similar; however, some small but significant differences were found between the groups. The certified respondents performed *Integrate basic science and fundamental knowledge with results of evaluation and patient goals into an individualized plan of care, Develop patient education plans and home programs, and Use evidence-based practice* at higher rates than did non-certified

respondents. A complete listing of domains and tasks can be found in [Exhibit 2](#).

[Table 3](#) shows the percent of direct patient care time spent in each region of the upper extremity. Almost one-third (30%) of time was spent on hand patients; 25% on wrist patients; roughly equal amounts on elbow, multijoint, and shoulder patients (13–15%); and only 3% on cervical patients. The ages and developmental levels of patients treated by hand therapists spanned all generations. The majority (61%) were adults, a quarter were geriatric, and the rest were adolescent and pediatric patients.

[Table 4](#) shows the percent of patients with whom the respondents performed various actions (i.e., screen, treat, or refer) in each region of the upper extremity. All therapists treated patients with

TABLE 2. Percent of Time and Criticality, Direct Patient Care Domains, 2008 and 2001

<i>Direct Patient Care Domains</i>	<i>Percent of Time</i>		<i>Criticality</i>	
	<i>Mean %</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
2008				
Evaluate upper extremity and relevant patient characteristics	27.1	11.8	3.7	0.5
Determine prognosis and plan of care	17.2	8.3	3.5	0.6
Implement therapeutic interventions	55.8	16.1	3.9	0.3
2001				
Evaluate upper quadrant and relevant patient characteristics	26.2	8.5	4.0	0.1
Develop treatment and discharge plans	16.3	7.2	3.9	0.4
Implement treatment plans	57.5	16.9	4.0	0.2

Criticality ratings: 1 = not critical; 2 = minimally critical; 3 = moderately critical; 4 = highly critical.

EXHIBIT 2. Scope of Hand Therapy Practice

Domains and tasks

The scope of practice of hand therapy may include one or more of 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 describes activities associated with professional practice. The domains and their associated tasks are listed below.

Evaluate upper extremity and relevant patient characteristics

- Obtain and review medical, psychosocial, and vocational/avocational history
- Interview patient and/or caregiver
- Identify factors that may affect rehabilitation potential (e.g., comorbidities)
- Plan for and select assessment tools
- Assess and document skeletal, muscular, nervous, vascular, lymphatic, skin, and connective tissue status
- Assess and document psychosocial, functional, and ergonomic factors and status
- Identify impairments, functional limitations, and disabilities based on the result of assessment
- Reassess and document patient status at appropriate intervals
- Identify factors that could affect an at-risk population (e.g., industrial, athletic, and performing artistic groups)

Determine prognosis and plan of care

- Integrate basic science and fundamental knowledge with results of evaluation and patient goals into an individualized plan of care
- Determine rehabilitation potential and expected functional outcomes
- Determine needs of an at-risk population (e.g., industrial, athletic, and performing artistic groups) and develop wellness and prevention programs
- Establish functional and measurable goals of intervention with an anticipated time frame for attainment
- Establish frequency and duration of intervention in collaboration with patient and referring physician within the guidelines of third-party payers
- Select appropriate intervention techniques
- Document the plan of care, including rehabilitation potential, goals, and interventions
- Identify appropriate resources to which patients can be referred
- Consult with and refer to other health-care professionals
- Reassess goals and outcomes and change plan of care as needed
- Assess readiness for return to former daily activities
- Assess readiness for discharge and formulate and document discharge plan.

Implement therapeutic interventions

- Implement/apply and modify the therapeutic interventions
- Develop patient education plans and home programs
- Provide patient education and validate patient learning

Professional practice

- Use evidence-based practice (integrate best available research evidence with clinical expertise and patient preferences)
- Interpret and apply clinical research and outcome studies
- Assess patient satisfaction
- Maintain ethical standards
- Comply with regulations that ensure environmental safety
- Comply with regulations governing practice based on relevant regulatory agencies
- Comply with organizational policies and procedures
- Document services provided
- Bill for services provided
- Advocate for patients
- Manage fiscal resources (i.e., recognition and consideration of fiscal constraints in patient management)
- Manage clinic administration (order supplies, review charges, perform chart audits)
- Supervise clinical support staff in the delivery of patient care
- Manage human resources (e.g., staffing, performance appraisal)
- Participate in case management

Advocate for the profession of hand therapy with employers, third-party payors, consumers, and other health-care professionals

Participate in ongoing professional development

Participate in activities and associations that advance professional practice and public welfare

Develop and implement educational programs for professionals

Participate in clinical research

Participate in professional development of students and/or other therapists

Scientific knowledge basis of hand therapy

The foundation of hand therapy is comprehensive understanding of

Surface anatomy of the shoulder, elbow, forearm, wrist, and hand

Anatomy and physiology of the skin/connective system

Anatomy and physiology of the muscular system

Anatomy and physiology of the skeletal system

Anatomy and physiology of the nervous system

Anatomy and physiology of the vascular and lymphatic systems

Development of age-specific hand function

Physical properties (e.g., heat, water, light, electricity, and sound)

Principles of tissue/wound healing

Kinesiology and biomechanics relative to the shoulder, elbow, forearm, wrist, and hand

Posture and its effects on the upper extremities

Pathomechanics relative to the shoulder, elbow, forearm, wrist, and hand

Etiology and pathology of medical conditions that may manifest with signs or symptoms in the hand or upper extremity

Surgical, nonsurgical, and medical treatment of conditions of the hand or upper extremity

Postsurgical, nonsurgical, and medical treatment guidelines

Standardized and nonstandardized assessment tools

Expected functional outcomes of treatment

Expected physiological and psychological effects of treatment procedures

Treatment rationale, indications, precautions, and contraindications

Treatment methods, techniques, and tools

Concepts and principles of orthotics (including mechanical properties of materials and components)

Concepts and principles of prosthetics

Principles of ergonomics at home, work, school, or leisure

Behavioral science (including cultural diversity) and psychological reactions to impairment

Research design and statistics, including evidence-based practice

Pharmacology and its effects

Basic laboratory values

Diagnostic imaging

Electrodiagnostics (e.g., electromyography, nerve conduction studies)

Teaching and learning styles

Regulatory and legal guidelines

Professional codes of ethics

Safe and appropriate use and maintenance of equipment and assistive devices

Safety techniques and procedures (e.g., infection control, emergency procedures, practitioner safety, environmental safety)

Billing and coding principles

Uniform terminology (practice framework)

Hand and upper extremity patients

Theoretical knowledge and technical skills are applied, using good clinical judgment, in assessment and treatment of individuals with diagnoses related to the upper quarter (hand, wrist, elbow, shoulder girdle, cervical area, or multiple joints). These may include but are not limited to

Adhesions or tightness (e.g., musculotendinitis, capsular)

Amputations

Arthritis and rheumatic diseases

Congenital anomalies/differences

Crush injuries/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 strains, tears, and avulsions
 Nerve injuries and conditions (e.g., neuropathies, palsies, nerve repairs)
 Neuromuscular diseases—ALS, MS, MD
 Pain (e.g., complex regional pain syndrome, fibromyalgia)
 Replantation and revascularization
 Spinal cord and central nervous system injuries
 Tendon injuries and conditions (e.g., lacerations, transfers, tendonitis, ruptures)
 Thermal and electrical injuries
 Vascular disorders
 Wounds and scars

Treatment techniques and tools

A variety of techniques and tools may be used in therapeutic intervention with hand and upper extremity patients, including but not limited to

Biofeedback techniques
 Compression therapy
 Continuous passive motion
 Desensitization
 Design and/or selection of adaptive/assistive devices
 Ergonomic and activity modification in home, work, school, or leisure
 Exercise
 Functional activity
 Hand writing techniques
 Joint protection instruction/energy conservation instruction
 Manual therapy
 Modalities
 Nutrition instruction
 Orthotic design, selection, fitting, fabrication, and training
 Patient education
 Prosthetics
 Scar management
 Sensory re-education
 Taping techniques
 Training in ADL/adaptive/assistive devices
 Wellness education
 Work conditioning
 Work hardening
 Wound care

ALS = amyotrophic lateral sclerosis; MS = multiple sclerosis; MD = muscular dystrophy; ADL - activities of daily living

conditions in the elbow, wrist, hand, and multijoint regions at similar rates. In the cervical region, therapists were more likely to screen and refer rather than treat.

Distributions of the methods by which the respondents acquired knowledge showed that 16 of the 36 knowledge areas (44%) were acquired by more than 50% of the respondents through basic education as

TABLE 3. Percent of Direct Patient Care Time in Each Region of the Upper Extremity

<i>Body region</i>	<i>% of Time</i>
Cervical	3
Shoulder girdle	13
Elbow	15
Wrist	25
Hand	30
Multijoint	15

Totals do not equal 100% due to rounding.

an OT or PT. Nine of the knowledge areas (25%) were acquired by 50% or more of the respondents through on-the-job training. The respondents whose qualifying OT or PT degrees were master's level or higher, acquired many more types of knowledge during basic education than did those with bachelor's degrees, who tended to acquire more knowledge through on-the-job training or continuing education.

Ratings of when knowledge should be acquired were generally consistent among the subgroups. The vast majority of the CHT respondents felt that all the knowledge areas surveyed should be acquired by the time therapists sit for the HTCC exam (i.e., during the first two years of practice in hand therapy or earlier). However, the respondents reported that they did not actually acquire all knowledge during that time frame. Table 5 compares the percentage who acquired knowledge in specific areas after the first two years of practice in hand therapy with their ratings of when they felt the knowledge should be acquired.

Frequency and criticality ratings for use of the techniques and tools of hand therapy were averaged together to assist in tracking trends. The results are displayed in Table 6. *Patient education, scar management, techniques to assess physical status, exercise, function, and the use of signs and tests* stood out as being used frequently as well as being rated very critical. Many modalities were also highly rated. Some techniques, such as *prosthetics*, were not used frequently, but were considered critical. The survey indicated that some modalities, including *phonophoresis, diathermy, and whirlpool* were not used often and were not critical. *Assessment of dexterity, functional capacity, and work sites* were used less than other assessment techniques. Assessment of *outcomes* was also rated rather low on both scales. *Complementary and alternative medicine* were the only techniques and tools rated below 2.0 on both scales; none of the techniques or tools in this category were used on even a monthly basis, and five were never used.

Validation of Domains, Tasks, Knowledge, Techniques, and Tools

The delineation of domains, tasks, knowledge, techniques, and tools developed by the PATF was overwhelmingly validated by the survey

TABLE 4. Percent of Patients on Whom You Perform Each Action in Regions of the Upper Extremity

<i>Body region</i>	<i>Screen (%)</i>	<i>Treat (%)</i>	<i>Refer (%)</i>
Cervical	60	27	79
Shoulder girdle	57	79	39
Elbow	47	98	6
Wrist	46	100	5
Hand	46	99	5
Multijoint	47	99	14

More than one action permitted.

respondents. All tasks achieved predetermined threshold levels for *Frequency, Criticality, or both*. *Frequency* ratings were at least monthly to weekly for all tasks except *Develop and implement educational programs for professionals, Participate in clinical research, and Manage human resources*. However, each of these tasks was rated at least moderately critical to optimizing patient outcomes. The average *Criticality* rating of each task was at least moderately to highly critical, with the exception to *Determine needs of an at-risk population*, which was barely below the moderately critical level, but which achieved the required *Frequency* rating for inclusion. All knowledge was rated as necessary to be obtained before therapists become eligible to sit for the HTCC exam, with 90% or more of the respondents believing all knowledge should be acquired during the first two years of hand therapy practice or earlier, with the exception of *Electrodiagnostics* and *Diagnostic imaging*, where 89% of the respondents gave the same rating. All the techniques and tools, other than those in the *Alternative and Complementary Medicine* category, met at least one of the threshold criteria for *Frequency* or *Criticality*, that is, rated as performed at least monthly to weekly and or at least moderately to highly critical. The validated domains, tasks, knowledge, diagnoses, and conditions of hand and upper extremity patients, and practice techniques and tools of the hand therapy profession are presented in Exhibit 2.

Validation of the Scope of Practice

The 2008 survey validated the previous scope of practice of hand therapy that was adopted in 2002. Each practice analysis study since 1985 has validated that hand therapy is an advanced practice specialty with its roots in both physical therapy and occupational therapy. This study verified previous findings that most specialized knowledge is gained within the first two years of hand therapy practice.

Test Specifications

The respondents provided recommended percentages of the certification examination to focus on each of the five domains of practice, including the three direct patient care domains and the two non-patient care domains. The PAAP reviewed these results and

**TABLE 5. Knowledge Acquired After First Two Years Practice as Hand Therapist:
When It Was Acquired versus When It Should Be Acquired**

<i>Knowledge Acquisition</i>	<i>Was Acquired after Two Years Hand Practice (%)</i>	<i>Should be Acquired after Two Years Hand Practice (%)</i>
Electrodiagnostics (e.g., electromyography, nerve conduction studies)	28	11
Diagnostic imaging	24	11
Posture and its effects on the upper extremities	17	2
Research design and statistics, including evidence-based practice	16	6
Pharmacology and its effects	16	5
Basic laboratory values	14	8
Billing and coding principles	14	4
Expected functional outcomes of treatment	13	1
Etiology and pathology of medical conditions that may manifest with signs or symptoms in the hand or upper extremity	12	4
Pathomechanics relative to the shoulder, elbow, forearm, wrist, and hand	12	4
Principles of ergonomics at home, work, school, or leisure	12	4
Concepts and principles of prosthetics	11	1
Teaching and learning styles	10	6
Expected physiological and psychological effects of treatment procedures	8	6
Development of age-specific hand function	8	5
Anatomy and physiology of the vascular and lymphatic systems	8	2
Regulatory and legal guidelines	8	1
Physical properties (e.g., heat, water, light, electricity, and sound)	7	3
Kinesiology and biomechanics relative to the shoulder, elbow, forearm, wrist, and hand	7	2
Principles of tissue/wound healing	7	1
Surgical, nonsurgical, and medical treatment of conditions of the hand or upper extremity	6	2
Behavioral science (including cultural diversity) and psychological reactions to impairment	5	3
Postsurgical, nonsurgical, and medical treatment guidelines	5	2
Treatment rationale, indications, precautions, and contraindications	3	4
Treatment methods, techniques, and tools	3	3
Concepts and principles of orthotics (including mechanical properties of materials and components)	3	2
Anatomy and physiology of the skin/connective system	3	1
Uniform terminology (practice framework)	3	1
Anatomy and physiology of the nervous system	2	1
Surface anatomy of the shoulder, elbow, forearm, wrist, and hand	2	1
Standardized and nonstandardized assessment tools	1	2
Anatomy and physiology of the muscular system	1	1
Anatomy and physiology of the skeletal system	1	1
Professional codes of ethics	1	1
Safety techniques and procedures (e.g., infection control, emergency procedures, practitioner safety, environmental safety)	1	1
Safe and appropriate use and maintenance of equipment and assistive devices	0	0

after thoughtful discussion, derived the final test specifications presented in Table 7.

Consistent with the very high criticality ratings, the percentage of time estimates, and the recommended examination percentages, the PAAP determined that 74% of the exam will focus on the three direct patient care domains and 26% will focus on the remaining two domains. Of the percentage of the examination focused on patient care domains, just over one third will focus on *Implement Therapeutic Interventions* (30%), and with the others divided into *Evaluate Upper Extremity and Relevant Patient Characteristics* (26%) and *Determine Prognosis and Plan of Care* (18%). Of the percentage of the examination focused on non-patient care domains, the PAAP determined that the majority will focus on *Basic Science and Fundamental Knowledge* (20%), and only 6% will focus

on *Professional Practice*. In determining this distribution, the PAAP considered the contribution of the underlying knowledge base to the provision of services and the achievement of optimal patient outcomes. The validated tasks and knowledge provide well-supported information to inform item writing and test construction. The results on diagnostic conditions seen and areas of the upper extremity treated will also help target items during exam construction.

DISCUSSION

Use of Technology

Technology played an important role in the fourth practice analysis study. Previous surveys were given via pencil and paper, with responses mailed to PES

TABLE 6. Techniques and Tools: Frequency and Criticality Ratings

<i>Techniques and Tools</i>	<i>Frequency Ratings</i>	<i>Criticality Ratings</i>
<i>Patient education</i>	4.9	3.9
<i>Scar management</i>	4.5	3.8
<i>Techniques to assess:</i> ADL, edema, vascular status, pain, ROM, tightness, strength, muscle function, sensibility, sympathetic function, handedness	4.2	3.6
<i>Exercise:</i> mobility, strengthening, endurance, nerve and tendon gliding, dexterity/coordination, PNF	4.0	3.6
<i>Orthotics:</i> design, selection, fitting, fabrication and training of orthotic devices	3.8	3.8
<i>Function:</i> functional activity, sensory re-education, desensitization	3.8	3.6
<i>Signs and tests</i>	3.7	3.3
<i>Modalities:</i> cryotherapy, fluidotherapy, hot packs, iontophoresis, NMES/electrical stimulation, paraffin, ultrasound	3.5	3.1
<i>Joint protection and energy conservation</i>	3.4	3.6
<i>Ergonomics:</i> ergonomic and activity modification in home, work, school, or leisure	3.3	3.5
<i>Activities of daily living:</i> design/select and train in use of adaptive/assistive devices	2.8	3.5
<i>Manual therapy:</i> manipulation, joint, edema and nerve mobilization, myofascial release, massage, strain/counterstrain	2.8	3.0
<i>Prosthetics</i>	2.7	3.4
<i>Wound care:</i> suture/staple removal, debridement, cleansing, topical treatment, dressings	2.6	3.1
<i>Work hardening and conditioning</i>	2.6	3.2
<i>Compression therapy:</i> taping techniques, pressure garments, wraps	2.5	3.2
<i>Techniques to assess:</i> dexterity, functional capacity, work site, outcomes	2.4	2.8
<i>Nutrition and wellness education</i>	2.4	2.8
<i>Modalities:</i> cold laser, contrast baths, diathermy, ice with compression, light, phonophoresis, TENS, whirlpool	2.0	2.2
<i>Handwriting techniques</i>	2.0	2.7
<i>Biofeedback</i>	1.7	2.6
<i>Electrodiagnostic tests</i>	1.6	2.3
<i>Complementary and alternative medicine:</i> active release therapy, acupuncture, craniosacral techniques, movement, Reiki, Tai Chi, Yoga	1.2	1.7

Frequency ratings: 1 = never, 2 = monthly or less, 3 = weekly /almost weekly, 4 = daily, 5 = several times a day.

Criticality ratings: 1 = not, 2 = minimally, 3 = moderately, 4 = highly.

ROM = range of motion; ADL = activities of daily living, PNF = proprioceptive neuromuscular facilitation, NMES = neuromuscular electrical nerve stimulation, TENS = transcutaneous electrical nerve stimulation.

for hand data-entry; this study was deployed via computer worldwide. This resulted in a lower response rate overall (32% compared with 72% in 2001); however, it was comparable to response rates of other online surveys. Interestingly, international CHTs (from Canada, Australia, and New Zealand) responded at a higher rate (47%) than did those from the United States (34%), which indicates that the barriers of geography may have been overcome by allowing Internet access. This study will also form the basis of a revised online practice analysis survey, which will be available to countries that may wish to offer the CHT exam in the future.

Test Specifications

This survey had a significant impact on the blueprint for the HTCE.

The first three domains (*Evaluation, Developing a Plan of Care, and Implementing Treatment*) remained basically unchanged; however, one previous domain, *Population-Based Services*, was eliminated. This domain was added in 2001 in response to a perceived trend that hand therapists would treat specialized populations (e.g., injured musicians) in unique ways, such as in their work environment, creating a separate domain to capture this knowledge base.

Perhaps due to changes in the workplace and third-party reimbursement, these trends have not materialized, and questions related to special populations were reclassified into the first three domains.

Two domains related to practice management and professional activities were merged into a new fourth domain, now called *Promote Professional Practice*. The weight of this domain was also decreased slightly to allow a greater emphasis on clinical questions. This domain now encompasses all questions about evidence-based practice, safety and legal concerns, billing, coding, and practice management.

Finally, a new fifth domain *Fundamental Knowledge and Basic Science*, representing 20% of the test, was created. Considerable discussion occurred among the subject-matter experts who designed the survey on the importance of science as the basis of hand

TABLE 7. Test Specifications

<i>Domain</i>	<i>% of Exam</i>
Basic science and fundamental knowledge	20
Evaluate upper extremity and relevant patient characteristics	26
Determine prognosis and plan of care	18
Implement therapeutic interventions	30
Professional practice	6

therapy. Although this knowledge always has been the underpinning of the test, it was integrated into the other domains rather than being reflected as a specific percentage of the test. For example, a question related to anatomy of the upper limb might have been classified in the *Evaluation* domain. By creating a new domain for basic science questions, HTCC believes that fundamental knowledge will be more accurately reflected on the examination.

Trends in Hand Therapy Education

One of the primary goals of the 2008 study was to view trends in hand therapy education to see if it has changed as practice has evolved. The present study explored the educational experiences of three hand therapist subgroups: those who have practiced as hand therapists for five years or less; those with five to 16 years of experience; and those with 16 or more years of hand therapy practice. The results show more similarities than differences related to when and how these groups gained the unique knowledge, techniques, and tools used in the profession. Overall, those with less experience reported acquiring the requisite knowledge and skills sooner in their professional careers than those with more experience. The most experienced group acquired more knowledge after they were already treating a specialized hand therapy caseload and gained knowledge more often through on-the-job training and continuing education than did the other groups.

Master's level OTs and PTs report learning *ergonomics*, and *research design and statistics, including evidence-based practice* through formal education much more frequently than those entering at the bachelor's level. Although there are obvious differences between the formal education of bachelors and master's trained OTs, they are not as striking as that reported by their PT counterparts. The master's level PTs credited their formal education for 18 of 36 knowledge acquisition statements at least 20% more often than the bachelor's level PTs. HTCC will continue to track this phenomenon as the number of therapists with advanced degrees increases. The recent transition to master's level entry for OTs and PTs in the United States may result in new practitioners having substantially different professional development and continuing education needs than their predecessors.

Many knowledge areas were identified as being learned after formal education in OT or PT, thus supporting that hand therapy is an advanced specialty. Most of the respondents attributed generic and basic knowledge attainment to their formal professional education programs. However, 45% or more respondents reported that they did not acquire knowledge of the following areas until the first two years of specialized hand therapy practice: *postsurgical, nonsurgical, and medical treatment guidelines;*

surgical, nonsurgical, and medical treatment of conditions of the hand or upper extremity; expected functional outcomes; treatment rationale, indications, precautions, and contraindications; and treatment methods, techniques, and tools. This is not surprising as these knowledge areas are closely aligned with the clinical judgment and clinical reasoning competencies described by HTCC in the 2001 practice analysis.⁴ These competencies are dependent on clinical experience and professional maturity and acquiring them during specialized practice is expected.

The CHT respondents felt that knowledge should be acquired before sitting for the examination. However, they noted that this was not always the case. Some of it was never acquired by most of the respondents (i.e., *electrodiagnosis, diagnostic imaging, and basic laboratory values*), some was probably not taught in most professional programs before the 1980s (i.e., *research design and functional outcomes of treatment*), and some is knowledge that is specific to the upper limb (i.e., *effects of posture and pathomechanics*). In addition, some knowledge is probably developed over time. Therapists may not be attuned to what was learned at a specific point in time and this may account for some variations in responses in this area. For example, a therapist may have basic knowledge of orthotic fabrication acquired in school, but more advanced orthotics are learned during clinical practice and refined throughout their career.

Present Study Compared with Previous Studies

Although direct correlation to each of the previous studies cannot always be made, comparing the 2008 study to the others provides more clarity on how hand therapy education and training has evolved. The 1985 study also examined knowledge and skill acquisition and one significant change is very apparent. In 1985, many OTs did not use physical agent modalities and those who did use them reported learning primarily through on-the-job training and to a much lesser degree, through continuing education. In 2008, all OT respondents indicated that they have acquired this knowledge and use it frequently in hand therapy practice. These concepts are learned earlier in their careers, and if not in formal education, then most often in continuing education courses rather than through on-the-job training.

Today's hand therapists appear to focus on their patient's ability to function in life situations more than the respondents in earlier surveys. The respondents to the 1985 and 1994 surveys reported spending very little time teaching or modifying activities of daily living (ADL), function, and dexterity compared with the amount of time spent addressing the physical needs of their patients.³ The 2008 study shows a substantial shift in the importance attributed to this area

and the frequency with which it is addressed in present practice. This also correlates with the finding that knowledge of functional outcomes and evidence-based practice is being acquired earlier in one's professional career and is now mainstream in hand therapy practice and basic formal educational programs.

Practice Trends

This practice analysis identified other trends in practice. The 2008 practice analysis reflects a trend in hand therapy first noted in the 2001 practice analysis of increased referrals for the shoulder and cervical regions. The 2008 study sought to better understand the nature of the therapeutic interventions by having the respondents indicate whether they *screen, treat, or refer* patients with conditions in each body region.

The results show that referrals to hand therapists continue to be primarily for hand, wrist, elbow, and multijoint conditions. Eighty-three percent of hand therapists in the United States and 60% of Canadian hand therapists reported that they treat patients with shoulder conditions. However, less than 30% of hand therapists in all subgroups indicated that they treat patients with cervical conditions. Instead, most of the respondents reported that they typically screen patients for cervical problems and when found, refer the patients to other health-care providers for therapeutic intervention. HTCC has refined the definition of hand therapy based on these findings, changing "upper quarter" to "upper limb" and emphasizing the effect of physical impairments on activities, tasks, and ability to participate in life situations as defined by the World Health Organization.

Prior practice analyses have postulated that future hand therapists would provide increased services to special populations for groups such as musicians, athletes, and workers. This has not been the case. In work-related services, the practice analysis shows that non-CHTs are more likely to use work-related techniques and tools, such as *techniques to assess work site* and *functional capacity evaluation*, than CHTs. Perhaps this reflects the fact that these services are applicable to many types of diagnoses beyond the upper limb, such as injuries to the back, hips, and knees, and are therefore not specific to hand therapy. Although other populations may use specialized techniques, such as exercises designed for musicians or pediatric treatment, on the whole, they do not appear to be delivered in specific environments. Although some hand therapists may work with an orchestra or in a pediatric clinic, it seems more frequent that CHTs treat all age ranges and conditions within the scope of their normal practice.

The 2008 survey gathered information on several new, controversial, or less commonly used techniques and tools in addition to those traditionally used in hand therapy practice. Most of the less-established

techniques are in the *Complementary or Alternative Medicine* category, but there are others distributed throughout the other categories. Many therapists reported using *high-velocity manipulation and diathermy* as well as those included in *Complementary or Alternative Medicine* minimally, if at all, and with the exception of *relaxation training*, all were rated as being not critical to optimizing outcomes. However, although nearly half responded that it is unnecessary to learn these alternative techniques and they are never used by a majority of the respondents, more than a quarter of the respondents recommended that if they are learned it should be after two years of specialized hand therapy practice. This may indicate recognition that some unconventional techniques and tools may have a place in hand therapy as long as they are provided by a more-experienced hand therapist, and the acquired knowledge is obtained after more critical hand therapy knowledge has been learned. The results clearly indicate that these areas, if used, should be an adjunct to treatment and not a core component of hand therapy intervention.

With regard to the increasing importance placed on evidence-based data and research to support practice and reimbursement issues, it appears that few therapists are engaged exclusively in research. This may place a greater burden on educational programs to encourage their students to conduct research in upper limb rehabilitation and professional associations to disseminate the information.

CONCLUSIONS

HTCC Policy Changes

One of the purposes for the study was to use data obtained to update HTCC policies. Table 8 summarizes those changes. The most significant change was to allow therapists to submit clinical practice hours in hand therapy that were acquired at any time during their careers. Before this change, hours had to be acquired within the five years preceding the exam. The rationale for this change was that most specialized knowledge is gained within two years of hand practice and that knowledge can be retained over many years. The test itself is based on present clinical information, so a therapist would still need to study and be current to pass the test. There was also a small change made in hours allowed for recertification. India and South Africa were invited to become eligible to offer the test, based on their completion of the international practice analysis.

Revised Definition of Hand Therapy

The term *upper quarter* in the definition has been replaced with *upper limb* to more accurately reflect hand

TABLE 8. HTCC Policy Changes Resulting from Practice Analysis Data

Policy	Practice Analysis Data	Change
4,000 h of direct practice experience required in the five years preceding application to take the CHT examination.	Regardless of when or how it was achieved, the vast majority of respondents report that almost all hand therapy–related knowledge was acquired by the second year in specialized hand therapy practice.	HTCC will continue to require 4,000 h of direct practice experience, but it can be obtained at any time after becoming a certified or licensed OT or PT.
The Recertification Committee asked if they should accept continuing education hours related to yoga, acupuncture, and other forms of alternative medicine.	The practice analysis results show that the techniques and tools in the <i>Complementary or Alternative Medicine</i> category are not core components of present hand therapy practice and therefore are not included in the updated scope of hand therapy practice.	HTCC has limited the number of the hours of continuing education that will be accepted for recertification for courses taken in this category. These and other hand therapy practice trends will continue to be monitored by HTCC.
India and South Africa asked to become eligible countries to offer the CHT examination.	After completing the online practice analysis survey, practice in those countries was found to be similar to that in the other countries where the test is offered.	Therapists in India and South Africa are now eligible to take the examination, and work hours obtained in those countries may be used to meet the eligibility requirements.

HTCC = Hand Therapy Certification Commission; CHT = certified hand therapist; OT = occupational therapist; PT = physical therapist.

therapy practice. The hand therapist follows a holistic model, screening the individual for all physical abilities and their impact on one's ability to function in daily life. However, the focus of therapeutic intervention is primarily on how impairments in the structure or function of hand, wrist, elbow, and shoulder girdle limit an individual's ability to execute tasks and to participate fully in life situations.⁵ The definition now reads:

“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 and/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.”

Recommendations for Use of Education Data

HTCC collected extensive data on education of hand therapists in the 2008 survey. These data could be used by an organization or university that wishes to study professional education needs in depth. Overall conclusions were drawn from the data:

1. Therapists reported that fundamental knowledge (i.e., *anatomy, physiology, kinesiology*) was acquired during formal education. More specialized knowledge (i.e., *treatment of medical conditions, functional outcomes of treatment*) was acquired during the first two years of specialized practice.
2. When asked when knowledge *should* be acquired, the respondents universally indicated that they

would have liked to acquire the knowledge earlier, either during formal education or before specialized practice. However, it appears that experience is needed to fully integrate advanced knowledge. This presents an opportunity to develop postprofessional formalized educational programs that are curriculum based (as opposed to weekend workshops) to teach advanced skills and knowledge related to upper limb rehabilitation.

3. Conversely, when asked when *should* the ability to use *Techniques and Tools* be acquired, therapists reported that there were many techniques they would have liked to have learned within the first two years of hand therapy practice. These techniques would lend themselves to shorter training programs to bridge a knowledge gap or expand upon concepts that have been learned previously. Examples are:

- Techniques to assess tightness
- Functional capacity evaluation
- Work site evaluation
- Outcome measures
- Signs and tests (e.g., Tinel's sign, Adson's test)
- Fabrication and design of advanced orthoses (e.g., dynamic splints, fracture braces, and casting to mobilize stiffness)
- Wound care
- Compression therapy
- Manual therapy techniques
- Taping techniques

HTCC will continue to track practice data as part of its mission to support a high level of competence in hand therapy practice and to advance the specialty through a formal credentialing process.

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JHT Read for Credit

Quiz: Article # 142

Record your answers on the Return Answer Form found on the tear-out coupon at the back of this issue. There is only one best answer for each question.

- #1. This is the ____ such study by the HTCC
- 1st
 - 2nd
 - 4th
 - 10th
- #2. The results of the study guided the hand certification testers
- to modify the exam to meet changing trends in hand therapy
 - to keep the exam the same as in the past
 - to completely revamp the exam to meet changing trends in hand therapy
 - to delete all questions from the exam that concerned surgical procedures
- #3. The exam
- is prepared exclusively by the HTCC
 - is prepared exclusively by an outside professional testing company
 - is prepared exclusively by a randomly selected group of 10 CHTs
 - is a collaborative effort of the HTCC and a professional testing company
- #4. The practice analysis surveyed therapists from
- exclusively the US
 - exclusively Canada
 - only countries whose primary language is English
 - only the US and Canada
- #5. The most commonly reported condition or diagnosis was
- fracture
 - edema
 - arthritis
 - carpal tunnel

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