FR 11-71

Analysis of Practice for the Physical Therapy Profession: Entry-Level Physical Therapist Assistants

Kevin M. Bradley
Joseph Caramagno
Shonna Waters
Amanda Koch

Prepared for: **Federation of State Boards of Physical Therapy**
124 West Street South
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November 9, 2011

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ANALYSIS OF PRACTICE FOR THE PHYSICAL THERAPY PROFESSION: ENTRY-LEVEL PHYSICAL THERAPIST ASSISTANTS

Acknowledgements

A large number of people, in addition to the authors, were instrumental in conceptualizing and completing the work described in this report. Dr. Cindy Searcy, FSBPT's Managing Director of Assessment, oversaw the work and provided invaluable guidance and assistance throughout the process. Her responsiveness to HumRRO's various requests for information and work product reviews ensured this project progressed smoothly and efficiently. We would also like to acknowledge the support and insights of Richard Woolf, PT (FSBPT's Assessment Content Manager) throughout the course of this project. His knowledge of the physical therapy profession, the NPTE development process, and the challenges inherent in developing a valid licensure examination were tremendous contributions in ensuring discussions with the Subject Matter Expert groups in general, and the Task Force, in particular, were productive and thoughtful.

Members of the supporting expert groups organized by FSBPT are listed individually in the appendix. We would especially like to thank Rebecca Porter, PT, Ph.D., who participated in both the Oversight Panel and the Policy Group and provided an extra measure of additional support between meetings. We would also like to thank all the physical therapists and physical therapist assistants who completed practice analysis surveys in support of this important effort.

The American Physical Therapy Association (APTA) was instrumental in nominating individuals for the Task Forces and helped ensure a knowledgeable group that was representative of the profession. APTA, Advance for Physical Therapy and Rehab Medicine, and Today in PT were extremely responsive in actively publicizing the practice analysis surveys. Without their support, this project would not have been successful.

From HumRRO, we wish to thank Drs. Deirdre Knapp and Teresa Russell for their recommendations and guidance on numerous aspects of the planning and conduct of the practice analyses and in the preparation of the test blueprints. We would also like to thank Vasileios Papadimitriou of HumRRO, and Nikos Dimopoulos, formerly of HumRRO, for their programing expertise and flexibility in implementing necessary changes at various points in the process.

ANALYSIS OF PRACTICE FOR THE PHYSICAL THERAPY PROFESSION: ENTRY-LEVEL PHYSICAL THERAPIST ASSISTANTS

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ANALYSIS OF PRACTICE FOR THE PHYSICAL THERAPY PROFESSION: ENTRY-LEVEL PHYSICAL THERAPIST ASSISTANTS

Introduction and Overview

The Federation of State Boards of Physical Therapy (FSBPT) is responsible for developing and maintaining the National Physical Therapy Examination (NPTE) for physical therapists (PTs) and for physical therapist assistants (PTAs). The NPTE, the national licensure examination for the physical therapy profession, measures the knowledge required for safe and effective practice as an entry-level PT or PTA. Successful completion of the NPTE is an important step in the process of demonstrating that an individual is competent to perform as an entry-level practitioner.

Credentialing examinations are designed to be "content-valid," meaning that test content corresponds closely with occupational requirements. The validity of the test results for indicating competence to provide safe and effective physical therapy services is contingent upon the degree to which (a) questions on each examination measure important knowledge required for safe practice, and (b) the proportion of questions measuring various knowledge areas is commensurate with the importance of these areas to physical therapy practice.

The formal, systematic process for determining the content of a licensure examination is referred to here as an "analysis of practice" (other names for this process include occupational analysis, task analysis, job analysis, and role delineation study). This process begins with the identification of work requirements for entry-level practitioners and ends with the development of a formal set of test specifications, also known as a test blueprint, that delineates the knowledge related to safe and effective entry-level practice that will be included on the examination.

Because physical therapy practice evolves, it is imperative that the content of the licensure examinations be updated on an ongoing basis. Thus, a practice analysis must be conducted periodically to ensure that changes in entry-level requirements are incorporated into the licensure examinations. Revisiting the practice analysis regularly ensures that fewer test questions are included that assess skill areas of decreasing importance and that greater numbers of test questions address skill areas of increasing importance. The time frame for updating a practice analysis varies by profession; for the physical therapy profession, this analysis is conducted approximately every 5 years.

This report describes the steps completed to conduct an analysis of entry-level PTA practice and update the test blueprint for the NPTE for PTAs. In the next section, we describe the subject matter expert (SME) groups that provided significant input to the process. The majority of the report is then organized according to the two broad tasks conducted to ensure the content validity of the examinations. The first part describes the development of surveys of currently licensed PTAs (and PTs who supervise PTAs) to identify critical work activities and determine the knowledge and skills important for providing safe and effective care. In the second part we shift the focus from describing the profession to the activities related to constructing a test blueprint based on the survey results.

The focus of this report is on the PTA analysis of practice; however, some description of activities relevant to both the PT and PTA analyses of practice is included. This is because the efforts overlapped significantly in terms of design and methodology. Complete results of the analysis of practice for PTs are provided in a separate report. This project was conducted with contractual support from the Human Resources Research Organization (HumRRO). HumRRO is a non-profit personnel research and consulting firm dedicated to creating quality testing and training programs that improve human, occupational, and organizational effectiveness.

Supporting Expert Groups

The physical therapy practice analysis update was conducted with the help of multiple expert groups identified by FSBPT to play key roles in the process. These included an Oversight Panel, PT and PTA Task Forces, and a Policy Group. The individual members of these groups are listed in Appendix A.

Oversight Panel

The purpose of the Oversight Panel was to provide guidance to project staff and the PT and PTA Task Forces as they carried out their responsibilities. The Oversight Panel consisted of highly experienced PTs and PTAs familiar with the NPTE test development process, test blueprint, and current professional issues. Six physical therapists with experience in PT or PTA education and/or clinical practice agreed to participate in this group. Four of the panel members were female. Group members' years of experience ranged from 18 to 39 years with a median of 30 years. Their areas of expertise included orthopedics, neuromuscular PT, acute care, academic education, clinical education, and patient care with pediatric, adult, and older adult populations.

PTA Task Force

The Task Forces were given the critical role of developing the contents of the surveys and finalizing the test content outlines after the survey data were analyzed. The FSBPT contacted members of its jurisdiction licensing boards along with representatives in the profession (e.g., state chapters of APTA, APTA section presidents) to recruit nominees for the Task Forces. From the many well-qualified individuals who were nominated for and applied to become members of these Task Forces, 15 individuals were selected for each committee. The selection criteria were designed to ensure that the Task Force members were representative of the profession in terms of practice setting, specialty, geographic location, and demographic characteristics. The PTA Task Force included eight PTs and seven PTAs. Ten of the Task Force members were female. Group members' years of experience ranged from three to 29 years with a median of 11 years. All seven regions of the U.S. were represented, along with six areas of expertise (orthopedic, neuromuscular, acute care, geriatrics, clinical education, administration), and seven distinct work settings (outpatient, academic, hospital, private practice, inpatient/rehab, home health, extended care/skilled nursing). The seven PTAs held Associate degrees, two of the PTs had a Bachelor's degree, five of the PTs had a Master's degree, and one of the PTs had a doctorate in physical therapy (DPT) [1].

[1] A description of the PT Task Force is included in the report of the PT analysis of practice.

Policy Group

The policy group comprised individuals representing different stakeholder groups within the profession, and was selected to review the new test specifications in light of environmental or policy issues expected to influence entry-level practice within the next 5 years. This group included 13 individuals representing PT and PTA licensing boards, employers, educators, and clinicians as well as representatives from APTA, the Commission on Accreditation for Physical Therapy (CAPTE), and liaisons from the FSBPT Board and the Technical Advisory Panel. The Policy Group was tasked with (a) reviewing the Practice Analysis procedures and results (including the updated NPTE test blueprints that resulted from the Practice Analysis); (b) identifying current events or trends in the profession that might result in stakeholders (including students/future applicants for licensure, educators, employers, and others) requesting clarification or additional information about the Practice Analysis results; and (c) making recommendations concerning actions the FSBPT Board of Directors might take to be proactive regarding the anticipated reactions of stakeholders.

Analysis of Practice

The overall approach to update the analysis of physical therapy practice was similar to the steps completed in 2006 (Knapp, Russell, Bynum, & Waters, 2007a; Knapp, Russell, Bynum, & Waters, 2007b). Figure 1 displays the fundamental steps in our technical approach. The first step in the process involved gathering and reviewing background information to ensure that the current lists of work activities (WA) and knowledge and skill requirements (KSR) reflect current entry-level practice. Next, subject matter experts (SMEs) developed surveys of the importance of the work activities performed by PTs and PTAs, and the knowledge and skills required to perform those activities. After multiple rounds of review with supporting expert groups to ensure the surveys were comprehensive and technically accurate, a pilot test of the survey administration was conducted. Results of the survey pilot test were used to refine the surveys and the survey administration process. Next, the surveys were distributed on a larger scale to a random sample of PTs and PTAs. At the end of the survey administration window, a database was prepared for analysis, which included making decisions regarding omission of respondents' data due to missing data, experience level, employment status, and so forth. Statistical analyses were then conducted. A final round of review with the supporting expert groups was conducted to ensure the analysis results were consistent with current trends in the profession. Finally, the results of the survey were used to inform the construction of the test blueprint. A more detailed discussion of each step is included in the remainder of this report.

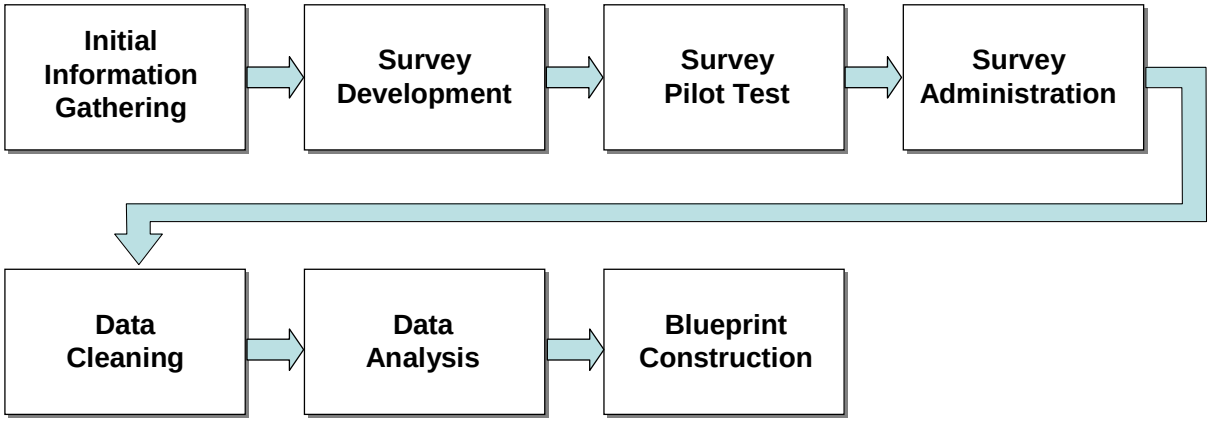

Figure 1. Overview of Project Approach.

Initial Information Gathering

Review of Existing Documentation

The existing test blueprints and the final 2006 work activities and knowledge and skill requirements lists served as the basis for the 2011 practice analysis surveys. To ensure the lists contained the most current information about entry-level physical therapy practice, a variety of materials were reviewed including current test development and candidate handbook materials published by FSBPT, professional practice documents published by FSBPT, APTA, and other relevant groups, and recently published papers and reports concerning health care in general, and physical therapy practice in particular. Below is a list that indicates some of the documents reviewed:

- 2006 Practice Analysis Reports
- Current NPTE Test Blueprints
- Guide to Physical Therapist Practice
- A Normative Model of Education
- Minimum required skills of PTs/PTAs at entry level (APTA)
- CAPTE Evaluative Criteria (PTs/PTAs)
- APTA Code of Ethics
- Preferred curricular model for DPT program
- Emerging areas of PT Practice
- Professionalism core values
- CPI (2005 version)

Updates to the Current Work Activities and Knowledge and Skill Requirement Lists

During the review, several additional work activities, knowledge areas, and skills that were potentially relevant to describing entry-level physical therapy practice were identified. The HumRRO project team discussed these potential additions with FSBPT in an effort to determine if they were truly unique or if they overlapped with existing statements. If the extent of overlap was ambiguous, or if it was clear that the proposed additions were unique, the content was added to the lists to be reviewed by the Oversight Panel.

Review with Oversight Panel

Prior to meeting with the PT and PTA Task Forces, the Oversight Panel met to discuss major issues associated with the project such as survey sample characteristics, definitions of entry-level and experienced PTs and PTAs, and the rating scales to be used on the work activities and knowledge and skill requirement surveys. In addition, the Oversight Panel reviewed the updated lists of work activities and knowledge and skill requirements and provided recommendations related to the content and format of these lists. Specifically, panel members identified: (a) content revisions to ensure the statements reflect current or emerging practices in the profession, (b) editorial changes to improve the clarity and readability of specific statements, and (c) format or structural changes to ensure consistency in the grouping and order of similar statements. The Oversight Panel also discussed methods for ensuring a suitable response rate, including incentives for completing the survey. The Oversight Panel decided that as an incentive for completing the survey, survey respondents would be invited to select one of four non-profit organizations to receive a donation.[2]

Post-Oversight Panel Meeting Revisions

After the Oversight Panel meeting, HumRRO reviewed the recommended revisions to the work activities and knowledge and skill requirements lists. Most of the minor edits (e.g., adding examples to enhance clarity of a specific statement; word substitutions) were made directly to the statements. Changes that could potentially have a broader impact, such as the restructuring of knowledge statements into more meaningful categories, were made and later presented to the Task Forces to obtain their feedback. When appropriate, the Oversight Panel's rationale for the recommended changes was documented.

Review with Task Force

After documenting the Oversight Panel members' recommended changes to the work activities and knowledge and skill requirements lists, the Task Force members participated in a facilitated discussion of the content, wording, and format of the work activity and knowledge and skill requirements statements and the changes suggested by the Oversight Panel. To ensure a comprehensive review of the statements, HumRRO asked questions similar to those listed below to elicit feedback:

- Is the list comprehensive in terms of the work activities/knowledge and skill requirements required to perform successfully at the entry-level?
- What additional work activities/knowledge and skill requirements contribute to successful performance at the entry-level?
- Are there any work activities/knowledge and skill requirements currently on the list that are not required to perform successfully at the entry-level?

[2] Following the survey administration, FSBPT made contributions to the Foundation for Physical Therapy, Samaritan's Feet, Nature Conservancy, and the Humane Society.

- Does the wording of each work activity and knowledge and skill requirements statement accurately reflect what is needed to perform successfully?
- Is the wording of each statement clear and succinct?
- Is each work activity and knowledge and skill requirements statement grouped in an appropriate category?
- Is each work activity and knowledge and skill requirements statement relevant to all work settings?
- Will the knowledge categories and system categories serve well as test blueprint categories?
- Does the list reflect emerging practice areas?

Post-Task Force Meeting Revisions

After the Task Force meeting, HumRRO and FSBPT performed additional clean-up of the lists and categories. This included a follow-up email with the revised lists to the Oversight Panel and Task Forces as well as a teleconference with the Oversight Panel to review the changes made by the Task Forces. The nature of their review was to reconcile any inconsistencies in the changes made by the two groups and ensure that any differences between the PT and PTA lists reflected substantive differences between the two occupations. Once final edits to the lists were approved by FSBPT, HumRRO used the lists to develop surveys to be distributed to a sample of entry-level and experienced physical therapists and physical therapist assistants.

Survey Development

Structure and Format

Web-based surveys were developed that provided comprehensive coverage of the activities performed by entry-level PTAs and the relevant knowledge and skills for completing those activities. The surveys were hosted on HumRRO's server and were designed to be accessible to any respondent with access to the Internet. Several features were incorporated into the design of the surveys to enhance usability, such as a pause feature that gave respondents the option to complete the survey in multiple, shorter segments. In addition, motivational statements conveying encouragement and information about the respondents' progress toward completion were interspersed throughout the surveys. Two versions of each survey were created in which the sequence of the statements was modified. This strategy was used to improve the quality of the data (to the extent that fatigue sets in as respondents progress through the statements) and ultimately to provide more data on the statements that would otherwise appear only toward the end of the survey.

Different surveys were created to target different respondent populations. Consistent with the 2006 studies, entry-level PTAs were recruited to judge the importance and frequency of the work activities they perform. Experienced PTAs as well as PTs who primarily supervise PTAs were asked to indicate the knowledge and skills required to perform successfully as an entry level PTA. There are two primary reasons for distributing the surveys in this way. First, entry-level professionals are likely to be in a better position to accurately describe the frequency with

which they perform the work activities while supervisors and more experienced incumbents are likely to be in a better position to describe the underlying knowledge required to perform those activities due to their increased expertise (Raymond, 2002). In addition, these surveys tend to be quite long so dividing the surveys in this way offers a way to reduce the burden (and hopefully increase the response rate) for respondents. For the purposes of this practice analysis, entry-level was defined as less than three years since initial licensure. This parameter was different from the 2006 practice analysis where entry-level referred to practitioners with less than five years since initial licensure. The Oversight Panel decided that three years would be more consistent with the current concept of an entry-level practitioner.

Respondents were directed to the appropriate survey based on their responses to two key background questions. The first question on the survey asked respondents to identify as PT or PTA; a separate question asked them to report years of experience. For example, if a respondent identified as a PTA, he or she was then asked the following question:

How much experience do you have working as a PTA?

1. Working as a PTA since June 1, 2008 or later
2. Working as a PTA since before June 1, 2008

Each survey consisted of three sections. The first section contained questions regarding respondents' background, such as years since licensure and primary work setting. The second section of the survey contained either the work activities statements, or knowledge and skill requirements statements. At the end of this section, respondents were encouraged to write in comments or specify work activities, skills, or knowledge areas they believed were missing from the survey. Finally, in the closing section, respondents were given an opportunity to provide comments and were invited to select one of four non-profit organizations to which FSBPT would make a donation in appreciation for the respondent completing the survey.

Rating Scales

The work activities surveys were designed to collect data on the frequency with which a licensed, entry-level PTA performs various work activities and the importance of those activities for providing safe and effective care. Work activity frequency and importance ratings were collected via Likert-type rating scales. A depiction of these rating scales is presented in Figure 2. The frequency rating scale ranged from 0 (Never) to 5 (More than once a day). The importance rating scale ranged from 1 (Unimportant) to 5 (Extremely Important). Respondents who indicated they do not perform a given work activity were not asked to provide importance ratings for that work activity.

The knowledge and skill requirements surveys were designed to collect data on the importance of each knowledge and skill area for an entry-level licensee to provide safe and effective patient care. Knowledge and skill requirements importance ratings were collected via a Likert-type rating scale that ranged from 0 (Knowledge is not needed) to 5 (Extremely Important). An illustration of the knowledge importance rating scale is provided in Figure 3.

	Frequency						Importance for Safe and Effective Care				
	Never	A few times a year	Once a month	Once a week	Once a day	More than once a day	Unimportant	Minimally important	Important	Very Important	Extremely Important
Sample Work Activity											
Train in aerobic capacity/endurance conditioning	0	1	2	3	4	5	1	2	3	4	5

Figure 2. Work Activities Survey Rating Scales.

	Importance for Safe and Effective Care					
	Knowledge is not needed	Not Important	Minimally Important	Important	Very Important	Extremely Important
Sample Knowledge Statement						
Knowledge of pharmacological management of the cardiovascular/pulmonary system	0	1	2	3	4	5

Figure 3. Knowledge and Skill Requirements Survey Rating Scales.

Pilot Test

Pilot Administration. FSBPT, HumRRO staff members, and SMEs completed multiple reviews of the surveys in an effort to ensure the surveys were clear and comprehensive. However, to minimize the likelihood that respondents might misinterpret or fail to understand the survey instructions, some of the statements on the survey, or the types of responses expected of them, a pilot test of the surveys was administered to a small group of respondents to (a) try out the survey administration procedures and (b) evaluate the clarity of the survey instructions and items.

FSBPT contacted all member jurisdictions and requested names, addresses, date of licensure, and license type for all actively licensed PTs and PTAs. An aggregate list spanning all licensing jurisdictions was compiled, and from this list, a random sample of 525 entry-level and experienced PTs and PTAs was selected. Each licensee was assigned a random access code and was mailed a letter inviting her or him to participate by completing the survey and providing her or his feedback. The letter explained the purpose of the practice analysis and the purpose of the pilot study, and indicated the website address of the survey and the individual's assigned password. Sample letters from the pilot survey administration and the operational survey administrations are included in Appendix B.

Pilot test respondents were asked to provide feedback about the survey and the initial contact letter they received asking them to participate. Specifically, respondents were asked the following questions regarding the *introduction* and *background questions*:

- Is the information provided in the introduction clear and complete? If not, what information is unclear or incomplete?
- Did you have trouble answering any of the background questions? If so, which ones and why?

Respondents were asked to comment on the *survey content* and *other factors related to the survey administration* by responding to the following six questions:

- Are the instructions for completing this section clear?
- Are the response scales easy to use?
- Please identify by number any statements that were unclear to you and briefly describe what was unclear.
- Please use the space below to tell us about any relevant entry-level area we failed to include on this survey.
- Please provide any other feedback you have regarding this survey.
- Please provide any feedback you have regarding the initial contact letter you received asking you to participate in the survey.

Substantive changes made as a result of the pilot test are described below.

Pilot Response Rate. Of the 525 licensees invited to participate in the pilot study, 39 responded and provided complete data. Taking into account the 22 letters returned as undeliverable, the response rate for the pilot survey was just under 8%. A more detailed

breakdown of the points wherein potential respondents self-selected out of the process is presented in Table 1. This table shows that significant numbers of potential respondents were lost because they never accessed the survey site. In addition, a fair number was assigned a version of the survey other than the version that was anticipated based on their license type and license date as reported by the jurisdiction. Sometimes a PT or a PTA is newly-licensed in one jurisdiction but has been practicing in another jurisdiction for many years. This individual would have been identified as entry-level if he were sampled from his new jurisdiction when he was in reality experienced. Hence, there were 33 individuals who accessed the site that were expected to be entry-level PTs, based on their licensure dates reported by the jurisdiction from which they were sampled. Of these 33, only 19 were assigned the PT work activities survey.

Table 1. Survey Access and Completion Rates for Pilot Survey

	Entry-level PT (WA)	**Experienced PT (KSR)**	**Entry-level PTA (WA)**	**Experienced PTA (KSR)**
# mailed	200	100	175	50
# reached (# mailed minus # returned undeliverable)	192	96	168	47
# accessed site	33	10	19	7
Access rate (# accessed divided by # reached)	**17%**	**10%**	**11%**	**15%**
# assigned this survey	19	11	17	20
# completed this survey	6	10	10	13
Completion rate (# complete divided by # assigned)	**32%**	**91%**	**59%**	**65%**

Note: WA refers to the work activities survey and KSR refers to the knowledge and skill requirements survey.

Since an 8% response rate would not result in sufficient sample sizes for the actual survey administration, several changes were planned in an effort to ensure a higher response rate. First, the operational survey was slated to be active for a greater length of time than the pilot. Whereas the pilot study was open for approximately four weeks, the actual survey would need to be open for six weeks or longer. Second, additional reminders were sent. Third, to reduce the likelihood of incorrectly identifying a respondent as entry-level, a more extensive check during the sampling process was conducted to identify licensees who are licensed in more than one jurisdiction. While this last step does not in and of itself boost the number of responses, it increased the likelihood of attaining the desired balance of responses across the surveys.

Pilot Survey Results and Revisions to Surveys and Administration Process

Respondents' comments were reviewed with FSBPT staff and several Oversight Panel members to jointly determine the changes that would be made based on the pilot test data. Most of the comments indicated the survey was clear and comprehensive, but there were two substantive changes made on the basis of pilot survey feedback. First, one reviewer suggested that EMG/ventilator controls/ICU care should be covered in greater detail. In response, the knowledge statement: 'Knowledge of the function and implications and related precautions of intravenous lines, tubes, catheters, and monitoring devices' was added to the survey. Another reviewer indicated there were some statements where the distinction between knowledge related

to PT interventions or knowledge related to medical interventions was unclear. Accordingly, revisions were made to clearly distinguish between medical interventions and PT interventions on all survey statements where there was potential for confusion.

There were also some comments that provided recommended revisions that were not applied to the surveys. For example, one pilot study participant indicated there were some activities they perform more than once a day, but less than once a week, and therefore they would have liked to have seen an additional response option. As the majority of pilot test respondents indicated the response scales were easy to use, no changes were made to the response scales.

Survey Administration

Administration Process and Sampling Plan

Potential survey respondents were identified from the list of actively licensed PTs and PTAs that was collected by FSBPT. This master list contained names, mailing addresses, license type (PT or PTA) and number, and license issue date and jurisdiction for PTs and PTAs licensed in U.S. licensing jurisdictions. There were 310,446 licenses in this aggregate roster, but many of the licenses were held by individuals licensed in more than one jurisdiction. A stratified, random sample of 17,900 names was selected from the master roster to ensure that the final sample of respondents would be large enough to provide stable results and representative of the population of PTs and PTAs. The number of licensees to be contacted was driven by the general goal of ensuring the final results would be reliable and reflective of the population of entry-level PTA practice.

First, the minimum sample sizes needed to achieve stable sample means were determined for each survey (PTA WAs and KSRs, as well as PT WAs and KSRs). The formula for the standard error of the mean ($\sigma \div \sqrt{n}$) was incorporated in an effort to determine the minimum sample size that would yield a standard error of the mean less than or equal to 0.10 raw score points. For example, in the 2006 practice analysis survey, the maximum standard deviation across the PT work activities response rating scales (frequency and importance) was 2.10. To ensure the mean importance rating of this work activity would be stable within $\pm$0.10 scale points, a sample size of 441 respondents would be required. This is calculated by rearranging the standard error formula and dividing the observed/anticipated standard deviation (2.10) by the desired standard error (0.10) and squaring the result. Similar calculations were made for the remaining surveys, and the corresponding minimum required sample sizes are presented in Table 2. Note that fewer respondents are needed for the knowledge and skill requirements surveys than for the work activities surveys. This is due to the fact that the 2006 standard deviations of the knowledge and skill requirements importance ratings were smaller than the standard deviations of the work activities frequency and importance ratings.

In addition, the intra-class correlations (ICCs) observed in the 2006 data were examined and these values were adjusted using the Spearman-Brown prophecy formula in an effort to determine the minimum sample size that would be needed for the mean rating across respondents to yield a reliability value equal to 1.00. These sample sizes are also reported in Table 2.

Table 2. Determination of Minimum Acceptable Sample Sizes

Survey	Maximum *SD* 2006	Recommended *N* based on SE rule	Minimum ICC 2006	Recommended *N* based on reliability rule
PT Work Activities	2.10	441	.42	137
PT Knowledge	1.08	117	.38	162
PTA Work Activities	2.20	484	.36	176
PTA Knowledge	1.19	142	.35	184

These considerations indicated that reliable, accurate results could be achieved with sample sizes less than 500, and in some cases, less than 200. At the same time, it is possible that targeting sample sizes as low as 200 respondents could be viewed as insufficient. Thus, we set our target sample sizes at 800 for the PT work activity survey, 600 for the PT knowledge and skill requirements survey, 700 for the PTA work activity survey, and 500 for the PTA KSR survey.

The overall usable response rate across surveys in the 2006 practice analysis was 20.2%, but differed substantially by survey type. The response rate ranged from 14.8% (PT work activities survey) to 32.5% (PTA knowledge and skill requirements survey; Knapp et al., 2007a).[3] Based on the response rate from the 2006 practice analysis and knowledge of response rates attained in other practice analyses, a greater number of letters were sent out compared to the desired number of respondents. Initial sample sizes were as follows:

- Entry-level PT = 8,250
- Experienced PT = 2,100
- Entry-level PTA = 6,400
- Experienced PTA = 1,150

For each sampled licensee, a letter was prepared that described the purpose of the survey, and provided the internet address and unique identification number for each individual. Contact letters (see Appendix B for a sample) were mailed the last week of April, 2011.

The initial survey response was slower than anticipated, due in part to the fact that the letters had been sent standard-rate (as opposed to first-class) mail. In 2006, there was a noticeable surge in survey responses four or five days after the letters were mailed; in 2011, a similar surge did not occur until the third week. Due to the slow initial response, combined with a sizable number of undeliverable letters, a supplemental sample of an additional 1,903 licensees (primarily entry-level PTs and PTAs) was drawn. All respondents were sent a reminder postcard approximately three weeks after their initial letter was mailed. Each letter and reminder postcard provided participants their unique access code and directed them to the website where the survey was hosted.

[3] One reason the response rates for the knowledge and skill requirements surveys are greater than the response rates for the work activities surveys is that many of the individuals thought to be entry-level are in fact experienced. Therefore, some of them respond to the survey, but they are directed to the knowledge and skill requirements survey. In addition, some of them report supervising PTAs, in which case they were directed to the PTA knowledge and skill requirements survey – thereby driving up the apparent PTA KSR response rate.

In addition to sending letters and reminder postcards, email addresses were requested from respondents who logged into the survey site but did not complete the survey. Individuals who provided an email address were sent up to two reminder emails requesting they return to the site and complete the survey.

Throughout the survey administration window, the response rate was monitored on a regular basis. Two of the surveys (PTA KSR survey and PTA WA survey) were approaching the target sample sizes as of June 13, 2011. However, the response rates for the PT work activities and PT knowledge and skill requirements surveys did not appear to be sufficient to achieve the target number of respondents. These surveys were opened to all licensed PTs and PTAs (referred to herein as the 'convenience sample'), regardless of whether they were identified in the original random sample by publicizing them on websites, in newsletters and email notices, and through social networking media.[4] The last wave of data collection provided enough responses to achieve all target sample sizes, and the surveys were closed on July 19, 2011.

Data Analysis

Data Cleaning and Screening

The analysis of survey data included a series of steps to ensure the integrity and appropriateness of the data. Initial steps were taken to eliminate unusable survey responses, such as out-of-range responses, missing information, and abnormal response behaviors (e.g., flat responding). We removed: (a) cases with excessive missing data, and (b) data from ineligible respondents (e.g., retired or unemployed and not looking for employment as a PT or PTA). These steps were taken to confirm that respondents were directed to and completed the correct survey (e.g., experienced PTAs should have responded to the PTA knowledge and skill requirements survey). The final samples used in the analyses were based on the criteria displayed in Table 3 and Figure 4.

Table 3. Criteria for Inclusion in Analysis Samples

Employment status	Missing data	Flat responding
• Full-time salaried/hourly • Part-time salaried/hourly • Full-time self employed • Part-time self employed • Unemployed, seeking employment as a Physical Therapist/Physical Therapist Assistant	Respondent is missing responses on 10% or fewer of the survey items	Respondent varied his or her responses (did not use any single rating for more than 95% of the survey items *and* the standard deviation of his or her ratings is less than 0.25)

[4] In addition to APTA, Advance for PT, and Today in PT, numerous licensing boards responded affirmatively and efficiently to our request for assistance in publicizing the final wave of survey data collection. If it had not been for their support, it is unlikely we would have been able to meet our desired sample sizes for the PT work activities and PT knowledge and skill requirements surveys.

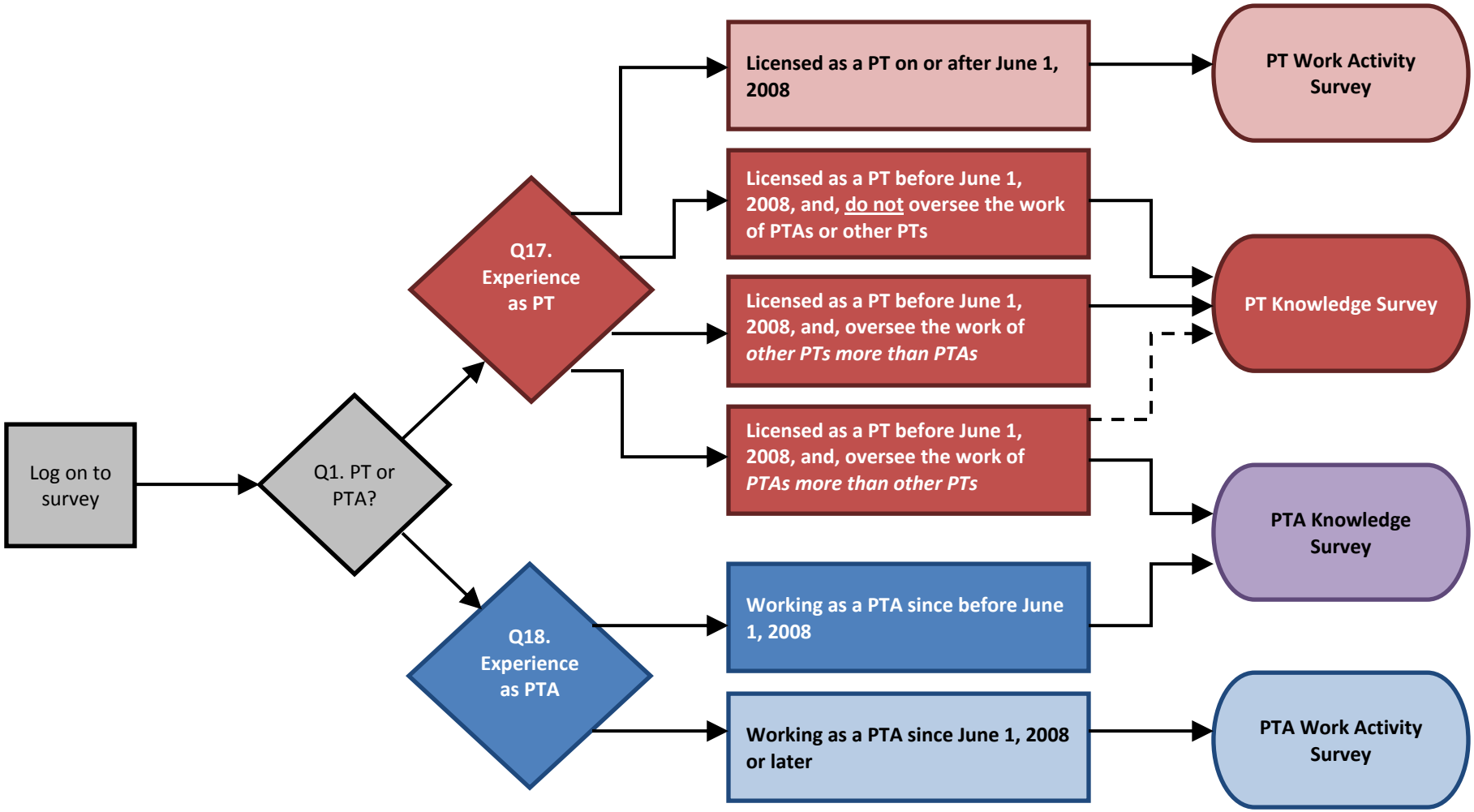

Figure 4. Survey Assignment Flowchart.

Note: After the target number of responses for the PTA knowledge and skill requirements survey was reached, experienced PTs that supervise PTAs were directed to the PT KSR survey instead. This action is portrayed in the figure above by the dotted line.

Response Rates and Final Analysis Samples

Two primary factors complicate the calculation of the survey response rate. First, some individuals responded but were assigned a survey version other than the version they were originally projected to receive. For example, it is not known precisely how many entry-level PTs were contacted because an unknown number were misidentified as entry-level. This makes it difficult to establish the base rate, or denominator, to compute the response rate. Second, as mentioned previously, the survey was opened to individuals who had not been in the original sample. Including these people as respondents in the calculation of the response rate would inflate the actual response rate.

To address these challenges, multiple calculations are presented that reflect survey participation rates. First, the response rate for individuals in the random sample is displayed in Table 4. These rates exclude respondents in the convenience sample (i.e., those who responded to the broadcast invitations to complete the survey) and 30 respondents who logged into the survey and indicated they received a letter in the mail but no longer had the letter with their unique identification number. Response rates are calculated for each of the four survey samples, however, a fifth group, "PTA: unknown experience level" is displayed in this table. In some jurisdictions, it was difficult to discern if PTAs licensure dates reflected dates of initial licensure or dates of license reissue. Because confidence in the experience level of PTAs in these jurisdictions was low, no attempt was made to stratify by experience level in these jurisdictions. As can be seen in Table 4, the overall response rate was 14.6%. This is lower than the 2006 response rate of 20.2%, as well as the 2001 response rate of 17%. The response rates for experienced PTs and PTAs are slightly higher than the response rates for entry-level PTs and PTAs.

Two additional aspects of the response rate were calculated in an effort to shed light on factors contributing to the low response rate. First, the survey access rate reflects the percent of those sampled who accessed the survey site and completed at least the background questions. Second, the usable data reflects the percent of those who began the survey and met the inclusion criteria for that survey (i.e., experience level and employment status) and provided responses to at least 90% of the items. In general, the survey access rates were a little lower than during the 2006 practice analysis (overall access rate in 2006 was 27% whereas in 2011 it was 22%). The completion rates are generally high; though they are little lower in 2011 than during the 2006 practice analysis (overall completion rate among those who began a survey was 76% in 2006 whereas in 2011 it was 72%). In general, the major factor contributing to the low response rates was the low survey access rate.

One aspect of these response rates that should be clarified is that while the response rates reported in Table 4 and the access rates in Table 5 suggest small differences between samples, a significant number of respondents projected to be entry-level PTs were in fact experienced. As displayed in Tables 5 and 6, 4,213 PTs and PTAs accessed the survey site and 4,178 PTs and PTAs began a survey. This indicates that nearly all PTs and PTAs who accessed the survey site

began a survey.[5] However, when the number who accessed the survey site (second to last row of Table 5) is compared with the number who began a survey (first row of Table 6), it becomes evident that significant numbers of respondents were not assigned the survey they were projected to receive. As expected, many respondents were sampled from jurisdictions in which they were newly licensed, but this recent licensure date failed to capture additional years of licensure in another jurisdiction.

While the response rate is lower than desired, the results based on analysis of the survey data are stable. For the vast majority of the work activities and knowledge and skill requirement statements identified as critical for entry-level practice, the same conclusions would have been reached unless hundreds (and in some cases, thousands) of additional respondents indicated they never perform the work activity or the knowledge and skill requirement is not needed for entry-level PTAs.

Table 4. Percentage of Original Random Sample Who Completed a Survey

	License Type and Experience Level as Determined by Date of Licensure					
	PT: Entry-level	PT: Experienced	PTA: Entry-level	PTA: Experienced	PTA: Unknown experience level	Total
# sampled	9,278	2,267	6,859	713	686	19,803
# undeliverable	354	39	175	10	7	585
# contacted	8,924	2,228	6,684	703	679	19,218
# completed survey	1,279	386	925	124	88	2,802
Response rate	14.3%	17.3%	13.8%	17.6%	13.0%	14.6%

Note. "# completed survey" indicates the number of respondents in the projected group that completed any survey version, which often was not the version they were projected to complete. Survey respondents from the convenience sample are excluded from these calculations.

PTA WA and KSR Results

The remainder of this section provides a summary and discussion of results from the PTA work activities and knowledge and skill requirements surveys.

Sample Description

Tables 7, 8, and 9 present descriptive information about the final sample of survey respondents. Note that for the knowledge and skill requirements survey, both experienced PTs that supervise PTAs and experienced PTAs were sampled. Not surprisingly, there are differences between two samples attributable to their experience level (i.e., entry-level versus experienced) and job (i.e., PT versus PTA). For example, a slightly larger portion of experienced PTs and PTAs indicated their primary area of responsibility is in an administrative function or in academic education, whereas nearly all of the entry-level PTAs are in direct patient care. In addition, experienced PTs who supervise PTAs reported spending a greater portion of their time

[5] Thirty-five potential respondents accessed the survey site but did not complete the background questions and hence were not assigned a survey.

in a health system outpatient or hospital-based outpatient facility or clinic (18% versus 13%). In contrast, entry-level PTAs spend more time than supervising PTs in a private outpatient office or group practice (21% versus 17%) and skilled nursing facilities (33% versus 29%). Experienced PTAs also spend more time in skilled nursing facilities than their experienced PT counterparts (35% versus 29%); however, they spend less time in private outpatient offices or group practices (14% versus 17%). As might be expected, entry-level and experienced PTA respondents were considerably more likely to have earned an Associate degree (66% and 70%, respectively) rather than a baccalaureate.

Sample Representativeness

It is important to evaluate the representativeness of the sample compared to the population of entry-level and experienced PTAs. One challenge in answering this question is that no national database exists that contains background and experience characteristics. Most licensing boards collect limited information about their licensees, and in general, they only release information in support of official licensing board activity. Similarly, FSBPT collects limited data about applicants for licensure and is not in a position to collect information from these individuals after they pass the NPTE and obtain their license. APTA collects information about its members, but APTA members are not necessarily an accurate representation of the population of all licensees. For this reason, the Oversight Panel and Task Force members were asked to review the sample characteristics and identify any sample characteristics that were unexpected. In some instances, especially when the Oversight Panel and/or Task Force members raised a question, additional information and guidance was sought to evaluate the possibility that the final sample might not be representative of the population.

One aspect of the sample that stood out to Oversight Panel and Task Force members was the geographic distribution of entry-level PTAs (high percentages from the south and midwest and low response rates from the northeast and west). Using data from FSBPT's roster of test-registrants and with the licensure database accumulated from the jurisdictions, 17.2% of the entry-level PTA licenses are in northeastern states, 26.5% are in midwestern states, 11.8% are in western states, and 44.5% are in southern states. Compared to these estimates, the response rates to the PTA work activities survey are all reasonably close (within five percentage points) of the apparent license distribution.

Another demographic question that yielded unexpected results was the question on 'first professional degree earned'. In response to this question, none of the entry-level PTAs selected 'Baccalaureate' and a small percentage (11%) selected 'Other'. It is possible many of the respondents that selected 'Other' did so because they were unfamiliar with the term 'Baccalaureate'. Most of the 11% that selected 'Other' provided a written explanation for their response that could be recoded as 'Baccalaureate'. In short, while there are some deviations from apparent population level distributions based on the available information, the sample is a reasonably good reflection of the population of licensed PTs and PTAs throughout the United States.

Table 5. Survey Access Rates

	Entry Level PT	**Experienced PT**	**Entry Level PTA**	**Experienced PTA**	**PTA (unknown experience)**	**Total**
Letters Sent	9,278	2,267	6,859	713	686	19,803
Number Undeliverable	354	39	175	10	7	585
Number Contacted	8,924	2,228	6,684	703	679	19,218
Number Accessed Survey Site	2,076	470	1,385	157	125	4,213
Percent Accessed Survey Site	**23%**	**21%**	**21%**	**22%**	**18%**	**22%**

Table 6. Survey Completion Rates for Primary Survey

	PT WA Survey	PT KSR Survey	PTA WA Survey	PTA KSR Survey	Total
# began survey	1,318	870	1,010	980	4,178
# eliminated due to missing data	530	138	306	136	1,110
# completed	788	732	704	844	3,068
# eliminated based on one or more inclusion criteria	4	16	5	22	47
# Complete Surveys	784	716	699	822	3,021
Completion rate among those who started survey	**59%**	**82%**	**69%**	**84%**	**72%**

Note. The inclusion criteria for the survey were that respondents had to be licensed as a PT or PTA; currently employed at least part time, or, looking for employment as a PT or PTA; they had to respond to at least 90% of the survey items; there had to be variability in their responses to survey items; and they had to be in the first three years post-licensure (for the work activities surveys) or had to be more than three years post-licensure (for the knowledge and skill requirements surveys).

Table 7. PTA WA and KSR Survey Respondent Background Information

	Survey							
	WA		KSR					
			PTs		PTAs		Total	
	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent
Respondent's Title								
PT	--	--	330	100.0%	--	--	330	40.1%
PTA	699	100.0%	--	--	492	100.0%	492	59.9%
Total	699	100.0%	330	100.0%	492	100.0%	822	100.0%
Gender								
Female	534	76.4%	254	77.0%	392	79.7%	646	78.6%
Male	162	23.2%	75	22.7%	98	19.9%	173	21.0%
Missing	3	0.4%	1	0.3%	2	0.4%	3	0.4%
Total	699	100.0%	330	100.0%	492	100.0%	822	100.0%
Demographic Groups								
American Indian or Alaska Native	7	1.0%	3	0.9%	9	1.8%	12	1.5%
Asian	42	6.0%	93	28.2%	7	1.4%	100	12.2%
African American or Black	44	6.3%	3	0.9%	20	4.1%	23	2.8%
White	606	86.7%	229	69.4%	453	92.1%	682	83.0%
Native Hawaiian or Other Pacific Islander	3	0.4%	7	2.1%	5	1.0%	12	1.5%
Respondents indicating more than one demographic group	15	2.1%	6	1.8%	8	1.6%	14	1.7%
Hispanic/Latino	46	6.6%	10	3.0%	20	4.1%	30	3.6%
First Professional Degree Earned								
Associate	621	88.8%	--	--	460	93.5%	460	56.0%
Baccalaureate	--	--	173	52.4%	--	--	173	21.0%
Postbaccalaureate certificate	--	--	4	1.2%	--	--	4	0.5%
Master's in Physical Therapy (MPT or MSPT)	--	--	108	32.7%	--	--	108	13.1%
Doctorate in Physical Therapy (DPT)	--	--	40	12.1%	--	--	40	4.9%
Other	78	11.2%	4	1.2%	30	6.1%	34	4.1%
Highest Academic Degree Earned								
Associate	461	66.0%	--	--	346	70.3%	346	42.1%
Baccalaureate	209	29.9%	120	36.4%	116	23.6%	236	28.7%
Master's	18	2.6%	124	37.6%	21	4.3%	145	17.6%
DPT	--	--	71	21.5%		0.0%	71	8.6%
Doctorate (PhD, EdD, Clinical Doctorate, other)	3	0.4%	4	1.2%	3	0.6%	7	0.9%
Other	7	1.0%	10	3.0%	5	1.0%	15	1.8%
Missing	1	0.1%	0	0.0%	0	0.0%	1	0.1%

Table 7. PTA WA and KSR Survey Respondent Background Information

	Survey								
	WA			KSR					
				PTs		PTAs		Total	
	Freq	Percent		Freq	Percent	Freq	Percent	Freq	Percent
Years Working as a PTA									
Less than .5 yr	170	24.3%	3 to 9 yrs	--	--	187	38.0%	187	22.7%
.5 to 1.5 yrs	126	18.0%	10 to 14 yrs	--	--	130	26.4%	130	15.8%
1.5 to 2.5 yrs	245	35.1%	15 to 24 yrs	--	--	128	26.0%	128	15.6%
2.5 to 3 yrs	158	22.6%	25 or more yrs	--	--	47	9.6%	47	5.7%
Total	699	100.0%	Total	--	--	492	100.0%	492	59.9%
Year of Initial Licensure									
2011	7	1.0%	2002 to 2008	189	57.3%	191	38.8%	380	46.2%
2010	252	36.1%	1997 to 2001	46	13.9%	123	25.0%	169	20.6%
2009	246	35.2%	1987 to 1996	52	15.8%	124	25.2%	176	21.4%
2008	194	27.8%	1986 or earlier	43	13.0%	54	11.0%	97	11.8%
Total	699	100.0%	Total	330	100.0%	492	100.0%	822	100.0%
Employment Status									
Full-time salaried	590	84.4%		247	74.8%	376	76.4%	623	75.8%
Part-time salaried/hourly	81	11.6%		62	18.8%	78	15.9%	140	17.0%
Full-time self employed	10	1.4%		12	3.6%	8	1.6%	20	2.4%
Part-time self employed	9	1.3%		6	1.8%	17	3.5%	23	2.8%
Unemployed, seeking employment as a Physical Therapist Assistant (Physical Therapist)	9	1.3%		3	0.9%	13	2.6%	16	1.9%
Total	699	100.0%		330	100.0%	492	100.0%	822	100.0%
Principal Area of Responsibility									
Administration	2	0.3%		6	1.8%	16	3.3%	22	2.7%
Consultation	0	0.0%		1	0.3%	1	0.2%	2	0.2%
Direct patient care	681	97.4%		312	94.5%	450	91.5%	762	92.7%
Research	0	0.0%		1	0.3%	0	0.0%	1	0.1%
Sales/marketing	0	0.0%			0.0%	1	0.2%	1	0.1%
Academic education	0	0.0%		2	0.6%	6	1.2%	8	1.0%
Clinical education	3	0.4%		1	0.3%	4	0.8%	5	0.6%
Other	7	1.0%		3	0.9%	8	1.6%	11	1.3%
Missing	6	0.9%		4	1.2%	6	1.2%	10	1.2%
Total	699	100.0%		330	100.0%	492	100.0%	822	100.0%
Percentage Time Direct Patient Care									

Table 7. PTA WA and KSR Survey Respondent Background Information

	Survey							
	WA		KSR					
			PTs		PTAs		Total	
	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent
0 - 20%	2	0.3%	1	0.3%	10	2.0%	11	1.3%
21 - 40%	5	0.7%	2	0.6%	5	1.0%	7	0.9%
41 - 60%	5	0.7%	11	3.3%	12	2.4%	23	2.8%
61 - 80%	73	10.4%	50	15.2%	72	14.6%	122	14.8%
81 - 100%	606	86.7%	263	79.7%	380	77.2%	643	78.2%
Missing	8	1.1%	3	0.9%	13	2.6%	16	1.9%
Total	699	100.0%	330	100.0%	492	100.0%	822	100.0%
Census Region of the Country for State of Primary Practice								
Northeast	80	11.4%	66	20.0%	90	18.3%	156	19.0%
Midwest	222	31.8%	63	19.1%	150	30.5%	213	25.9%
South	323	46.2%	113	34.2%	164	33.3%	277	33.7%
West	68	9.7%	53	16.1%	72	14.6%	125	15.2%
Other	0	0.0%	0	0.0%	1	0.2%	1	0.1%
Missing	6	0.9%	35	10.6%	15	3.0%	50	6.1%
Total	699	100.0%	330	100.0%	492	100.0%	822	100.0%
Census Region of the Country for States of Licensure								
Northeast	90	12.9%	114	34.5%	123	25.0%	237	28.8%
Midwest	229	32.8%	104	31.5%	186	37.8%	290	35.3%
South	343	49.1%	155	47.0%	201	40.9%	356	43.3%
West	71	10.2%	86	26.1%	94	19.1%	180	21.9%
Other	1	0.1%	1	0.3%	0	0.0%	1	0.1%
Licensed in Multiple States Representing Multiple Regions	40	5.7%	107	32.4%	105	21.3%	212	25.8%
Missing	11	1.6%	3	0.9%	9	1.8%	12	1.5%
Respondents Licensed in Multiple Jurisdictions	86	12.3%	188	57.0%	202	41.1%	390	47.4%
Primary Employment Setting								
Urban/Metropolitan	237	33.9%	117	35.5%	155	31.5%	272	33.1%
Suburban	275	39.3%	147	44.5%	201	40.9%	348	42.3%
Rural	187	26.8%	62	18.8%	136	27.6%	198	24.1%
Missing	0	0.0%	4	1.2%	0	0.0%	4	0.5%
Total	699	100.0%	330	100.0%	492	100.0%	822	100.0%

Note. The PTA knowledge and skill requirements survey was completed by both PTs and PTAs whereas the PTA work activities survey was only completed by PTAs. Demographic group percentages do not add to 100% as respondents could select zero, one, or more than one response. Census region of the country for states of licensure do not add to 100% as respondents could indicate multiple states representing multiple regions.

Table 8. PTA WA and KSR Survey Respondents Work Experience

	Survey											
	WA			KSR								
				PT			PTA			Total		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Percent of Time Spent in Each Facility												
Academic Institution (post-secondary)	693	0.27	3.04	328	0.78	7.53	487	2.43	14.73	815	1.77	12.37
Acute Care Hospital	693	10.98	27.09	328	11.81	28.08	487	10.82	26.95	815	11.22	27.40
Health and Wellness	693	1.48	10.20	328	1.11	8.90	487	0.72	5.63	815	0.88	7.12
Health System Outpatient or Hospital-based Outpatient Facility or Clinic	693	12.73	29.83	328	18.59	34.97	487	12.96	30.03	815	15.22	32.20
Industrial Health Center	693	0.20	3.87	328	0.94	8.41	487	0.60	7.19	815	0.74	7.70
Patient's Home/Home Care	693	8.65	25.77	328	12.55	29.99	487	12.13	29.60	815	12.30	29.74
Private Outpatient Office/Group Practice	693	21.36	39.00	328	17.08	35.68	487	14.24	32.78	815	15.38	33.98
Rehabilitation Hospital	693	4.65	18.30	328	4.54	18.21	487	5.09	19.46	815	4.87	18.96
Research Center	693	0.00	0.00	328	0.00	0.00	487	0.00	0.00	815	0.00	0.00
School System	693	2.28	13.24	328	1.57	11.39	487	2.04	13.04	815	1.85	12.40
SNF/ECF/ICF	693	33.43	44.42	328	28.63	41.97	487	35.39	44.08	815	32.68	43.34
Other Facility	693	2.96	16.19	328	1.80	12.38	487	2.55	14.57	815	2.25	13.73
Missing	6			2			5			7		
Total	693	99.86		328	100.00		487	100.00		815	100.00	
Percent of Time Spent in Patient Care Services												
Acute	694	11.41	26.26	325	11.18	27.16	476	10.74	25.87	801	10.91	26.38
Ambulatory/Outpatient	694	30.35	40.22	325	37.77	43.64	476	25.42	38.09	801	30.38	40.83
Chronic/Long-term	694	13.97	26.57	325	10.30	23.84	476	15.43	29.99	801	13.37	27.78
Critical	694	0.41	2.81	325	0.55	3.55	476	0.22	1.66	801	0.35	2.60
Emergency	694	0.02	0.42	325	0.02	0.44	476	0.10	2.04	801	0.07	1.60
Home	694	8.89	26.11	325	11.88	29.55	476	12.16	30.01	801	12.05	29.81
Hospice	694	0.13	1.19	325	0.32	2.22	476	0.15	1.27	801	0.22	1.72
Inpatient Rehabilitation	694	19.54	33.59	325	9.69	25.20	476	16.08	31.53	801	13.51	29.31
Prevention/Wellness/Health Promotion	694	2.49	9.82	325	0.88	3.99	476	1.83	7.58	801	1.45	6.40
School-based	694	2.22	13.07	325	2.23	14.15	476	2.15	13.32	801	2.18	13.65
Sub-acute	694	6.72	19.85	325	12.65	28.57	476	7.46	20.29	801	9.55	24.08
Other	694	3.05	16.07	325	0.95	7.10	476	4.48	19.10	801	3.06	15.53
Not Applicable	5			4			15			19		
Missing	0			1			1			2		
Total	694	99.90		325	99.63		476	99.46		801	99.53	

Table 8. (Continued)

	Survey											
	WA			KSR								
				PT			PTA			Total		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Percent of Patient Population by Age												
18 years and younger	698	7.47	18.07	325	10.30	23.48	479	5.52	15.35	804	7.44	19.16
19 to 65 years old	698	31.25	27.04	325	32.92	26.27	479	28.13	27.01	804	30.06	26.80
66 years and older	698	61.08	31.62	325	55.00	32.02	479	63.63	32.39	804	60.16	32.50
Not Applicable	0			2			10			12		
Missing	1			3			3			6		
Total	698	99.94		325	99.73		479	99.92		804	99.84	

Table 9. PTA Professional Affiliations by Survey Type

	Survey							
	WA		KSR					
			PT		PTA		Total	
	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent
APTA	165	23.6%	93	13.3%	92	13.2%	185	26.5%
APTA state chapter(s)	98	14.0%	84	12.0%	66	9.4%	150	21.5%
APTA section(s)	23	3.3%	59	8.4%	30	4.3%	89	12.7%
APTA special interest group(s)	4	0.6%	14	2.0%	8	1.1%	22	3.2%
American Academy of Orthopaedic Manual Physical Therapists (AAOMPT)	0	0.0%	5	0.7%	1	0.1%	6	0.9%
American Academy of Pain Management (AAPM)	0	0.0%	0	0.0%	0	0.0%	0	0.0%
American Academy of Wound Management (AAWM)	0	0.0%	0	0.0%	1	0.1%	1	0.1%
American College of Healthcare Executives (ACHE)	0	0.0%	0	0.0%	1	0.1%	1	0.1%
American College of Sports Medicine (ACSM)	4	0.6%	2	0.3%	4	0.6%	6	0.9%
American Council on Exercise	8	1.1%	0	0.0%	1	0.1%	1	0.1%
American Massage Therapy Association	4	0.6%	0	0.0%	6	0.9%	6	0.9%
National Athletic Trainers Association (NATA)	7	1.0%	3	0.4%	9	1.3%	12	1.7%
National Strength and Conditioning Association (NSCA)	6	0.9%	10	1.4%	7	1.0%	17	2.4%
Neuro-Developmental Treatment Association (NDTA)	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Vestibular Disorders Association (VEDA)	0	0.0%	3	0.4%	0	0.0%	3	0.4%
Other (please indicate)	36	5.2%	31	4.4%	33	4.7%	64	9.2%

Note: Narrative responses to "Other" were content analyzed but did not reveal a dominant alternative group affiliation. A majority of the write-in responses indicated no professional memberships (e.g., "none"). Examples of alternate affiliations include ABMP, Kinesio Taping Association, NASM, 'National Lymphedema Network, Lymphology Association of Australia, International Fitness Professionals Association, and American Senior Fitness Association.

Interrater Consistency and Agreement

Two types of intraclass correlation coefficients (ICCs; McGraw & Wong, 1996; Shrout & Fleiss, 1979) were computed to estimate the level of concordance (i.e., consistency and agreement) among the survey respondents. Consistency coefficients indicate the extent to which individuals concur on the relative level of the rating (e.g., Task X is more important than Task Y and less important than Task Z). Agreement coefficients are more stringent. They indicate how well the individual raters agree on the absolute rating (e.g., Importance of Task X equals '3' and Importance of Task Y equals '5'). As shown in Table 10, the agreement coefficients are slightly lower than the consistency ICCs. Consistency and agreement ICCs estimated for a single rater (1-Rater) and for the average number of raters (*k*-Raters) [6] are reported. The single rater estimates can be interpreted as the level of agreement (or consistency) to be expected between the ratings provided by any single rater with any other randomly selected single rater. The *k*-rater estimates indicate the degree of agreement (or consistency) to be expected between the sample average and the sample average that would be obtained if another random sample was drawn from the population. Essentially, with sample sizes as large as these, if the process were repeated, the same results would be expected. Because all of these estimates are 1.00, it can be concluded that the data are highly consistent across raters and strengthen confidence in the results.

Table 10. Estimates of Inter-Rater Reliability and Agreement

		Type of ICC			
	Number of	Consistency		Agreement	
Rating Scale	Items	1-Rater	*k*-Raters	1-Rater	*k*-Raters
WA Frequency	196	0.53	1.00	0.49	1.00
WA Importance	196	0.22	1.00	0.15	1.00
KSR Importance	127	0.38	1.00	0.28	1.00

[6] Note that in 2006, ICCs were computed for a single rater and for 500 raters. The 500-rater ICCs were computed because the software program used to compute them limited the analysis to 500 raters with complete data (i.e., no missing data). The current estimates are based on the harmonic mean for the analysis samples, excluding missing data points on a person by item basis. This approach accounts for missing data within the sample and does not limit the analysis to 500 raters. This change in approach results in one significant difference from 2006. Specifically, in 2006, work activity importance ratings were set to 0 for respondents who indicated not performing a work activity. If in 2006 those values had remained missing (instead of being replaced with 0), and cases with missing data had been eliminated listwise, then only those respondents who indicated performing every single work activity would have been included in the calculation of the work activities importance ICC in 2006. Setting those missing values to 0 resulted in higher ICC values for work activities importance ratings in 2006 than were observed in 2011. However, we believe the approach taken this year is conceptually most appropriate.

Establishment of Criticality Threshold for Work Activity Ratings

Recall that both frequency and importance ratings were collected for work activities and importance ratings for the knowledge and skills needed by entry-level PTAs. This information was collected to identify work activities and knowledge and skill requirements critical to the provision of safe and effective care by entry-level practitioners. Since it was expected that frequency and importance ratings would vary across work activities and knowledge and skill requirements, and that not all of the statements would be rated high, a criticality threshold was needed for determining which statements would be retained as critical for entry-level practice.

In the 2006 studies, a criticality index that combined importance and frequency was used to identify work activity statements that were (a) performed frequently and rated as important, or (b) performed infrequently but still rated as important. For the 2011 study, the criticality index was initially computed in a similar manner. However, in 2006, zeros were imputed for importance ratings for respondents that indicated they did not perform a work activity. Because the importance scale ranged from 1 (i.e., Unimportant) to 5 (i.e., Extremely important), a rating of 0 does not make conceptual sense. Therefore, an alternative approach was developed to establish a criticality index that did not involve imputation.

The alternative approach consisted of testing several cut-off values based on the frequency ratings alone (e.g., the percentage of the sample, such as 15%, 25%, or 35%, that perform a given work activity at any level of frequency greater than 0) and reviewing the work activity statements that fell below, at, or just above the threshold. HumRRO and FSBPT tentatively set the cut-off value at 25% (i.e., 25% of the sample perform a work activity at least a few times per year), as this seemed to be a point that reasonably distinguished critical from non-critical work activities, and the Oversight Panel confirmed this cut-off value. Each of the flagged statements, as well as those statements that fell at or just above the threshold, were presented to and discussed with the Oversight Panel and PTA Task Force to make final decisions to retain or remove them. It should be noted that the flagged subset of work activities were very similar to those removed from the lists in the 2006 studies.

Establishment of Criticality Threshold for Knowledge and Skill Requirements Ratings

For the knowledge and skill requirements importance ratings, the same approach that was used in 2006 was employed in the current study. Statements that were rated with a mean importance of 2.5 (i.e., half-way between “Minimally Important” and “Important”) or below were flagged for removal. Each of the flagged statements, as well as those statements that fell at or just above the threshold, were reviewed and discussed with the Oversight Panel and PTA Task Force.

Work Activity Frequency and Importance Ratings

As noted above, mean frequency and importance ratings were computed for each work activity statement. Appendix C presents the entire set of results. In most instances, these results mirrored the 2006 practice analysis results. The current data suggest that activities that fall within the following categories are typically performed more frequently than others:

- Information gathering and synthesis
- Systems review
- Modifying and/or progressing treatment within the plan of care
- Ergonomics and body mechanics
- Functional mobility and balance
- Joint integrity and range of motion
- Muscle performance and motor function
- Pain and sensory performance
- Environmental and community integration or re-integration
- Therapeutic exercise or activities
- Infection control
- Communication with patients, clients, or caregivers
- Documentation

In addition to being performed more frequently, these work activities were typically rated at a 4 (very important) or above for their level of importance for the provision of safe and effective care.

Activities performed relatively infrequently (once per month or less) were generally associated with the following categories:

- Research and evidence-based practice
- Emergency procedures
- Therapeutic and mechanical modalities
- Manual therapy techniques
- Integumentary repair and protection techniques
- Use of devices and equipment
- Reflex integrity
- Anthropomorphic
- Neuromotor development and sensory integration
- Nerve integrity
- Professional responsibilities

However, there were several exceptions within these categories. For example, the average frequency ratings for work activities within Therapeutic Modalities, Mechanical Modalities, and Devices and Equipment varied considerably ($\bar{X}$ = 0.52 – 4.05). Five work activities appear to be performed more frequently than others in these categories:

- Apply and/or adjust assistive devices (e.g., canes, crutches, walkers, wheelchairs, tilt tables, standing frames) ($\bar{X}$ = 4.05, *SD* = 1.29)
- Train in the use of assistive devices (e.g., canes, crutches, walkers, wheelchairs, tilt tables, standing frames) ($\bar{X}$ = 3.91, *SD* = 1.40)
- Perform cryotherapy procedures (e.g., cold pack, ice massage, vapocoolant spray) ($\bar{X}$ = 3.45, *SD* = 1.70)

- Perform hot pack thermotherapy procedures ($\bar{X}$ = 3.20, *SD* = 1.84)
- Perform electrical stimulation therapy (e.g., electrical muscle stimulation (EMS), TENS, functional electrical stimulation (FES)) ($\bar{X}$ = 3.18, *SD* = 1.84)

It should be noted that none of the work activities received an average importance rating less than 3.00. Despite the relative infrequency in which PTAs perform some of these activities, they were still rated as important for providing safe and effective physical therapy. This is not surprising since failure to perform these activities correctly could result in harm to the patient. For example, PTAs indicate that, on average, they implement emergency life support procedures less than a few times per year; however, failure to perform this activity correctly could result in significant harm or even death. Accordingly, this activity was given an average importance rating of 4.33, or between very important and extremely important.

In terms of confidence in the results, it would take many additional respondents providing negative responses before these conclusions would be overturned. Five work activities that barely surpassed the critical threshold ("Perform hydrotherapy procedures using contrast baths/pools," "Apply intermittent pneumatic compression," "Perform tests and measures of body composition (e.g., percent body fat, lean muscle mass)," "Report suspected cases of abuse involving children or vulnerable adults to the appropriate authority," and "Train in paraffin bath thermotherapy procedures") would require dozens of additional respondents (51, 65, 70, 79, and 84, respectively) indicating they never perform these activities in order to move these statements into the below threshold level. All other critical work activities statements would require between 94 and 2,051 respondents indicating they never perform the activity before they would fall below the criticality threshold.

Knowledge and Skill Requirement Importance Ratings

As noted above, mean importance ratings were computed for each knowledge and skill requirement (Appendix D). In most instances, these results mirrored the 2006 practice analysis results. Overall, the knowledge and skill requirements were rated as important ($\bar{X}$ = 3.62, *SD* = 0.59). Even the lowest rated knowledge requirement (Knowledge of pharmacological management of the genitourinary system) was seen as at least minimally important ($\bar{X}$ = 2.37, *SD* = 0.93). The statement "Knowledge of professional ethical standards" was the highest rated knowledge and skill requirement ($\bar{X}$ = 4.64, *SD* = 0.64). Despite generally high ratings for all statements, there was meaningful variability across knowledge and skill requirement categories. For example, of the systems, the musculoskeletal system received the highest average ratings while the genitourinary system received the lowest average ratings.

As with the work activities statements, calculations were performed to determine the number of additional respondents rating a knowledge or skill as unimportant for entry-level physical therapists that would be required to move a critical KSR into the not critical category. One knowledge and skill requirements statement (Knowledge of non-pharmacological medical management of the genitourinary system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)) could be overturned with as few as 29 additional respondents indicating this knowledge is unimportant. All other critical knowledge and skill requirements would require at least 88 (Knowledge of pharmacological management of the metabolic and

endocrine systems) and as many as 1,163 (Knowledge of factors influencing safety and injury prevention) respondents indicating it is unimportant before the results would be overturned.

Random and Convenience Sample Comparison

Because the survey was opened to a broader group of respondents (convenience sample) that were not in the original random sample, it is prudent to compare responses from these two groups to ensure that there are no appreciable differences in their average ratings of frequency and importance for the work activities and knowledge and skill requirements. Cohen's *d* statistic (Cohen, 1988) was used to estimate the magnitude of the difference between the two groups. This statistic is computed for each work activity or knowledge and skill requirements statement by dividing the difference between the mean ratings from the random sample and convenience sample by the standard deviation of the ratings from the random sample. A common heuristic for interpreting this statistic is that values that exceed ±0.80 are indicative of large differences between groups.

For the work activities statements, there were numerous instances where large differences in ratings between the two samples were found. However, the sample size limits the conclusions that can be drawn about the true frequency and importance of these activities and whether these results can be generalized to the larger population of PTAs. That there were only six individuals in the convenience sample who rated the frequency of the work activities raises questions regarding their representativeness of the extant population. Further, merging the convenience sample data with the random sample data has a very limited effect on the average frequency ratings. For example, the average frequency rating for the work activity 'Train in use of assistive devices (e.g., canes, crutches, walkers, wheelchairs, tilt tables, standing frames)' using the complete sample of data was 3.91. If the convenience sample data is removed, this value increases by 0.01 units. These results suggest that including or excluding data from the limited number of respondents in the convenience sample does not appreciably alter the conclusions that can be drawn.

There was a larger number of respondents in the convenience sample that completed the knowledge and skill requirements survey (n = 36 - 40) than the work activities survey; however, the sample is still strikingly small. For the vast majority of the knowledge and skill requirements mean importance ratings, the difference between the random and convenience sample was less than 0.40, which is typically considered a small difference between groups. However, there were four exceptions that pertained to the metabolic and endocrine systems and gastrointestinal system. Respondents in the random sample rated the following statements as less important than respondents in the convenience sample:

- Knowledge of secondary effects or complications from PT and medical interventions on metabolic and endocrine systems (Random Sample $\bar{X}$ = 3.11; Convenience Sample $\bar{X}$ = 3.55)
- Knowledge of secondary effects or complications on metabolic and endocrine systems from PT and medical interventions used on other systems (Random Sample $\bar{X}$ = 3.06; Convenience Sample $\bar{X}$ = 3.53)

- Knowledge of gastrointestinal system PT interventions and their applications for rehabilitation and health promotion according to current best evidence (e.g., positioning for reflux prevention, bowel programs) (Random Sample $\bar{X}$ = 2.97; Convenience Sample $\bar{X}$ = 3.51)
- Knowledge of anatomy and physiology of the gastrointestinal system as related to PT interventions, daily activities, and environmental factors (Random Sample $\bar{X}$ = 2.99; Convenience Sample $\bar{X}$ = 3.43)

The random sample mean ratings are much closer to the average ratings achieved with the full sample of data (since the vast majority of the respondents in the full sample are from the random sample). As such, merging the convenience sample data has little effect on the results. Furthermore, from a more conceptual viewpoint, the difference between the means is minimal. For all intents and purposes, the mean ratings fall between scale points 3 (Important) and '4' (Very Important) and differ by roughly half of a scale point. Thus, the results of these comparisons suggest that the differences in mean ratings between the two samples of PTAs are small and do not substantially change the survey results.

Subject Matter Expert Review and Establishment of Test Blueprints

Oversight Panel and Task Force Review

Following the administration of the surveys and the analysis of the survey data, the results were reviewed with the Oversight Panel and the PTA Task Force to (a) identify any areas requiring further exploration through data analysis, (b) make decisions concerning the work activities and knowledge and skill requirements that should be considered critical at entry-level, and (c) determine the weight that should be assigned to each topic area on the NPTE (establish test blueprints).

First, the survey results were presented to the Oversight Panel. The Oversight Panel reviewed the results of the demographic survey, and asked questions concerning the makeup of the sample. As described previously, the results of the survey were explainable and in line with available estimates of the broader population of PTs and PTAs. Next, the results of the work activities surveys were presented to the Oversight Panel. As described above, they agreed upon a threshold for declaring work activities critical for entry-level practice. If there was a solid rationale, they could override the survey results (for example, declaring a work activity as not critical even though it met the threshold). It was rare for the Oversight Panel (or the Task Force) to exercise this option.

The Oversight Panel completed a similar review of the knowledge and skill requirements survey results, adopting a threshold for declaring knowledge and skills critical for entry-level PTA practice. The Oversight Panel was also asked to review the knowledge and skill requirements and identify and discuss any knowledge and skill requirements they would recommend not be included on the NPTE test blueprint. Finally, the Oversight Panel was asked to allocate 100 percentage points across the different topic areas that were to be included on the final test (see Appendix E). After they provided their initial judgments, they engaged in a discussion regarding the rationale behind how they distributed their points. The aim of

conducting the blueprint exercise with the Oversight Panel was to obtain their feedback on the process and ask them for suggestions regarding the most effective way to facilitate the exercise with the Task Force members.

At the PTA Task Force meeting, a similar sequence of events was followed. Demographic survey results were reviewed first, followed by a discussion of work activities that should be considered critical for entry-level PTA practice. A similar procedure was then followed with the knowledge and skill requirements survey results, identifying critical entry-level knowledge and skill requirements and determining which KSRs should be excluded from the NPTE. Finally, the Task Force members engaged in the blueprint exercise.

Work Activity Results

The Oversight Panel reviewed the survey results (including the mean and standard deviation of ratings on each work activity) and made recommendations for the retention or deletion of work activities flagged due to low frequency and importance ratings. The group retained a small number of work activities that fell below the cut-off. In some cases, they also made recommendations to edit specific work activities to clarify their meaning and adjust the way in which some work activities were categorized to make the categories and subcategories easier to interpret and use. For example, there was only one statement in the 'Data Collection: Muscle Performance' category. The Oversight Panel recommended merging this category with 'Motor Function' (renaming the new category 'Muscle Performance and Motor Function') to avoid having a category that contained only one work activity. This and similar recommendations were documented for review with the PTA Task Force.

The work activity results annotated with the changes made by the Oversight Panel were presented to the PTA Task Force. The Task Force members reviewed the material, confirmed many of the Oversight Panel's recommended changes, and made some additional changes. There were several instances where the PTA Task Force disagreed with the Oversight Panel's decision to remove or retain specific work activities from the final list. For example, the Oversight Panel recommended dropping the statement 'Train in hydrotherapy procedures using contrast baths/pools' on the basis that fewer than 25% of the sample indicated they perform the activity, along with the belief that the relevant information exemplified by this statement is captured by other work activities.

While the PTA Task Force was permitted to override the survey results, there needed to be a clear and compelling rationale. While the Task Force voted to retain the above statement, the Oversight Panel determined they provided insufficient rationale for overriding the survey results. As a result, the Oversight Panel decided this activity should be removed in accordance with the empirical decision rule (i.e., the proportion of PTAs performing this activity was less than the 25% threshold). Ultimately, there were 17 work activities removed by the PTA Task Force. Table 11 presents the work activity statements that were edited or re-sequenced by the subject matter experts, and Table 12 presents the work activities that were dropped on the basis of the survey results and the subject matter expert review process. Appendix F presents the final list of critical work activities (as edited by the Oversight Panel and PTA Task Force).

Table 11. Work Activities Edited

Statement #	Statement text	Comment
Data Collection		
Anthropomorphic		
9	Perform tests and measures of...	
9a	...body composition (e.g., percent body fat, lean muscle mass)	'BMI' and 'hip-to-waist ratio' should also be included as examples. The Oversight Panel and PT Task Force agreed the results for this statement probably would have been higher had they been included.
Muscle Performance and Motor Function		The Oversight Panel and PTA Task Force agreed that the categories 'Muscle Performance' and 'Motor Function' should be combined since there was only one work activity statement (i.e., 27) under Muscle Performance.
27	Perform tests and measures of muscle strength, power, and endurance (e.g., manual muscle test, isokinetic testing, dynamic testing)	Moved based on category merge (see above comment) to appear before current item 26a (...muscle tone (e.g., hypertonicity, hypotonicity, dystonia))
INTERVENTIONS		
Procedural Interventions		
Therapeutic Exercise/Therapeutic Activities		
41	Train in strength, power, and endurance exercises	Moved to appear after 32 (Train in aerobic capacity/endurance conditioning)
Functional Training		
37	Train in mobility techniques (e.g., crawling, walking, running).	Moved to the category 'Functional Training'. The Oversight Panel and PTA Task Force recommended adding examples (e.g., crawling, walking, running).
38	Train in fall prevention and fall recovery strategies	Moved to the category 'Functional Training'.
71	Perform desensitization techniques (e.g., brushing, tapping, uses of textures)	Moved to Therapeutic Exercises/Therapeutic Activities, following # 39 (Train in neuromotor techniques).
72	Train in desensitization techniques (e.g., brushing, tapping, uses of textures)	Moved to Therapeutic Exercises/Therapeutic Activities, following # 39 (Train in neuromotor techniques).
49	Perform mechanical repositioning for vestibular dysfunction	Moved to Therapeutic Exercises/Therapeutic Activities, following # 39 (Train in neuromotor techniques).
50	Train in habituation/adaptation exercises for vestibular dysfunction (e.g., vestibuloccular reflex, position changes)	Moved to Therapeutic Exercises/Therapeutic Activities, following # 39 (Train in neuromotor techniques).
Pulmonary Interventions		The Oversight Panel and PT Task Force recommended creating a new category (Pulmonary Interventions) for statements 44 through 48.
Integumentary Repair & Protection Techniques		Rename section as 'Integumentary Repair'.

Table 12. Work Activities Deemed Not Critical

Statement #	Statement text	Comment
INTERVENTIONS		
Procedural Interventions		
Manual Therapy Techniques		
56	Perform manual lymphatic drainage	Excluded on basis of empirical decision rule and SME review.
61	Perform peripheral mobilization/manipulation (thrust)	Excluded on basis of empirical decision rule and SME review.
63	Perform spinal mobilization/manipulation (thrust)	Excluded on basis of empirical decision rule and SME review.
Integumentary Repair & Protection Techniques		
67	Perform nonselective debridement (e.g., removal of nonselective areas of devitalized tissue)	Excluded on basis of empirical decision rule and SME review. The PTA Task Force noted that insurance plans often do not cover debridement other than sharp and this requires specialized experience.
68	Perform selective enzymatic or autolytic debridement (e.g., removal of specific areas of devitalized tissue)	Excluded on basis of empirical decision rule and SME review. The PTA Task Force noted that insurance plans often do not cover debridement other than sharp and this requires specialized experience.
69	Perform sharp debridement (e.g., removal of specific areas of devitalized tissue)	Excluded on basis of empirical decision rule and SME review.
Therapeutic Modalities		
81	Perform hydrotherapy procedures using pulsatile lavage	Excluded on basis of empirical decision rule and SME review. The PTA Task Force noted that this activity is not cost-effective, limiting the frequency with which it is performed.
82	Perform hydrotherapy procedures using whirlpool tanks	Excluded on basis of empirical decision rule and SME review. The PTA Task Force noted that this activity is not cost-effective, limiting the frequency with which it is performed.
83	Perform infrared light agent procedures	Excluded on basis of empirical decision rule and SME review.
84	Perform monochromatic infrared agent procedures (e.g., Anodyne®)	Excluded on basis of empirical decision rule and SME review.
85	Perform phototherapy (laser light) procedures	Excluded on basis of empirical decision rule and SME review.
86	Perform ultraviolet light procedures	Excluded on basis of empirical decision rule and SME review.
89	Perform dry heat thermotherapy procedures (e.g., Fluidotherapy)	Excluded on basis of empirical decision rule and SME review.

Table 12. (Continued)

Statement #	Statement text	Comment
Mechanical Modalities		
95	Train patient/client in intermittent pneumatic compression	Excluded on basis of empirical decision rule and SME review.
100	Apply hyperbaric therapy	Excluded on basis of empirical decision rule and SME review.
101	Apply negative pressure wound therapy	Excluded on basis of empirical decision rule and SME review.
102	Train patient/client in negative pressure wound therapy	Excluded on basis of empirical decision rule and SME review.

Knowledge and Skill Requirements Results

The Oversight Panel reviewed the survey results (including the mean and standard deviation of ratings on each work activity) and made recommendations for the retention or deletion of knowledge and skill requirements flagged due to low importance ratings ($\bar{X} < 2.5$). Panel members were presented with a list of borderline statements—those with a mean importance rating between 2.5 and 2.75. The panel members considered the empirical decision rule; however, they went through a rational process for each statement to arrive at their recommendation. For example, although knowledge statements dealing with non-pharmacological and pharmacological medical management of the genitourinary and gastrointestinal systems were flagged based on their mean importance ratings, the Oversight Panel recommended that they be retained because they saw those knowledge requirements as important for all systems. Furthermore, they viewed those statements within the genitourinary system as reflecting emerging practice because there has been a change in the population being treated by PTs and PTAs (e.g., aging population, increased attention on women's health). In contrast, although the mean importance rating was above the threshold, the panel recommended dropping "Knowledge of applications, indications, contraindications, and precautions of hydrotherapy (e.g., pulsed lavage, whirlpool)" to correspond with their recommendation to drop the associated work activities. Although the Oversight Panel's recommendations were not considered final, their recommendations and associated rationales were presented to the PTA Task Force for consideration.

There is a direct link between the knowledge and skill requirements and the test blueprint for the licensure examination. As such, a key task for the PTA Task Force was to make decisions regarding which knowledge and skill requirements would be included on the NPTE content outline. As discussed above, the results of the analysis of practice survey were used to identify critical statements, as defined by those receiving an average importance rating greater than 2.5 on a 5-point scale. Statements with ratings between 2.5 and 2.75 were flagged as borderline and those with ratings less than 2.5 were flagged as not meeting the criticality threshold for review by the Oversight Panel and the PTA Task Force. The Task Force members considered the recommendations of the Oversight Panel as well as the decisions made by the PTA Task Force for similar statements. Table 13 presents a list of the knowledge requirements the PTA Task Force recommended dropping from the NPTE content outline and their associated rationale.

In addition to dropping knowledge and skill requirements from the blueprint because they were not found to be critical for entry level PTs, other statements were dropped from the content outline because they are not suitable for testing on the NPTE (Table 14). Statements presented in Table 14 were determined not to be suitable for the NPTE because the statement (or a similar statement) was (a) included on the current NPTE content outline but proved to be difficult to assess using multiple-choice items, or (b) the statement was determined to be unsuitable for a multiple-choice test focused on clinical application of knowledge (in many cases these were also excluded from the 2006 content outline for that reason). For example, in some cases (e.g., Knowledge of health information technology), the content changes frequently, such that an item could be obsolete by the time it ever makes it onto a test form. In other cases, the knowledge varies by jurisdiction, making it inappropriate for a national examination. After generating the preliminary list of knowledge and skill requirements that would not be testable on the NPTE, it

was reviewed by the Oversight Panel and Task Forces. A more thorough discussion of the criteria for evaluating assessments for suitability in testing various dimensions of human performance can be found in Knapp, Russell, and Bradley (2011).[7]

Table 13. KSR Statements Excluded from NPTE Content Outline

Statement Number	Statement Text	Rationale
9	Knowledge of pharmacological management of the lymphatic system	Knowledge is beyond entry level. Could not generate relevant examples of pharmacological management specific to the lymphatic system.
84	Knowledge of applications, indications, contraindications, and precautions of light modalities (e.g., laser, infrared, ultraviolet)	Knowledge had only weak linkages to critical work activities.
88	Knowledge of applications, indications, contraindications, and precautions of hydrotherapy (e.g., pulsed lavage, whirlpool)	Knowledge had only weak linkages to critical work activities.

The final list of knowledge and skill requirements included in the NPTE content outline can be found in Appendix G. It was this list that served as the basis for the blueprint exercise.

Recognizing the limitations of knowledge-based multiple-choice tests, FSBPT wanted to probe further to determine (a) ways in which these critical but difficult-to-test knowledge and skill requirements could be measured, (b) ways in which they are measured by benchmark organizations, and (c) how, other than through the NPTE, PTs and PTAs acquire and demonstrate that they have these difficult-to-test knowledge and skills. First, a literature review was conducted to identify ways in which FSBPT could measure the knowledge and skill requirements if FSBPT supplemented the NPTE with other test formats in the future. Next, websites and documentation of benchmark organizations were reviewed to determine how they handle these topics. Finally, SMEs were asked to identify ways in which PTs and PTAs acquire and demonstrate competence in these areas. The results of the literature review and review of benchmark organizations are summarized in Appendix H.

[7] Some of the knowledge and skills indicated in Table 14, while not directly assessed and scored, are likely to be correlated with test performance. For example, individuals with excellent Reading Comprehension or Critical Thinking skills might perform better on the NPTE than individuals with very low standing on these skills. However, the NPTE is not intended to gauge candidates' standing on these attributes, and questions are written to minimize any unintentional or unnecessary reading demands.

Table 14. Difficult-to-Test KSR Statements (Excluded from NPTE Content Outline)

Statement Number	Statement Text	Rationale
98	Knowledge of professional ethical standards	Difficult to write items focused on clinical application; jurisdiction specific
99	Knowledge of standards of billing, coding, and reimbursement	Changes rapidly; varies across settings
101	Knowledge of obligations for reporting illegal, unethical, or unprofessional behaviors (e.g., fraud, abuse, neglect)	Difficult to write items focused on clinical application
102	Knowledge of state and federal laws, rules, regulations, and industry standards set by state and accrediting bodies (e.g., state licensing entities, Joint Commission, CARF, CMS)	Changes rapidly; jurisdiction specific
103	Knowledge of risk guidelines (e.g., policies and procedures, incident reports)	Varies by practice setting; global principles tend to be very easy items
107	Knowledge of socio-cultural issues that impact patient/client management (e.g., language differences, ethnicity, customs, demographics, religion)	Difficult to write items focused on clinical application; multiple-choice items tend to be too easy or overly specific; more appropriately measured by oral examinations, role-plays, or portfolios
108	Knowledge of socioeconomic factors that impact patient/client management (e.g., social status, economic status, support system)	Difficult to write items focused on clinical application; multiple-choice items tend to be too easy or overly specific; more appropriately measured by oral examinations, role-plays, or portfolios
109	Knowledge of health information technology (e.g., electronic medical records, telemedicine)	Changes rapidly, many different systems are used
110	Knowledge of teaching and learning theories and techniques	Difficult to write items focused on clinical application; items have poor survival rates
111	Knowledge of health behavior change models (e.g., social cognitive theory, health belief model)	Difficult to write items focused on clinical application; items have poor survival rates
112	Knowledge of communication strategies	Difficult to write items focused on clinical application; items have poor survival rates
113	Knowledge of literature access techniques	Changes rapidly, many different systems are used
116	Active listening - Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times	Inappropriate for written multiple-choice test
117	Speaking - Talking to others to convey information effectively	Inappropriate for written multiple-choice test

Table 14. (Continued)

Statement Number	Statement Text	Rationale
118	Reading Comprehension - Understanding written sentences and paragraphs in work related documents	Difficult to write items focused on clinical application
119	Critical Thinking - Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems	Difficult to write items focused on clinical application
120	Social Perceptiveness - Being aware of others' reactions and understanding why they react as they do	More appropriately measured by situational judgment tests, structured interviews, or role plays
121	Time Management - Managing one's own time and the time of others	More appropriately measured by work samples
122	Coordination - Adjusting actions in relation to others' actions	More appropriately measured by work samples
123	Writing - Communicating effectively in writing as appropriate for the needs of the audience	Inappropriate for written multiple-choice test
124	Active Learning- Understanding the implications of new information for both current and future problem solving and decision-making	Inappropriate for written multiple-choice test
125	Persuasion – Persuading others to change their minds or behavior	More appropriately measured by oral examinations, structured interviews, or role plays
126	Negotiation – Bringing others together and trying to reconcile difference	More appropriately measured by oral examinations, structured interviews, or role plays
127	Service Orientation — Actively looking for ways to help people	More appropriately measured by situational judgment tests, structured interviews, or role plays

The Oversight Panel and the PTA and PT Task Forces provided the subject matter expertise necessary to identify ways in which PTs and PTAs acquire and demonstrate competence in these areas. Specifically, the Oversight Panel identified types of activities in which the skills and knowledge might be acquired and/or demonstrated. The PTA Task Force participated in a group discussion to identify the activities most commonly adopted to acquire or demonstrate each of the difficult-to-test knowledge and skill requirements. At the PT Task Force meeting, we decided to use an independent judgment process. Each of the PT Task Force members completed a matrix in which they made judgments regarding which of the activities were the most common ways to acquire or demonstrate each of the difficult-to-test knowledge and skill requirements. Table 15 presents activities for which at least 70% of the PT Task Force members indicated the KSR could be acquired and/or demonstrated.

As seen in Table 15, the results indicate that most of the difficult-to-test knowledge and skill requirements are covered as part of degree coursework. In addition, many skills are covered in clinical education or field work. The biggest gaps were found for knowledge of health information technology, persuasion and negotiation skills, and service orientation.

Table 15. Most Common Ways to Acquire / Demonstrate Difficult-to-Test KSR Statements

Statement Number	Statement Text	Activity
98	Knowledge of professional ethical standards	Degree coursework, jurisprudence / ethics exams
99	Knowledge of standards of billing, coding, and reimbursement	Degree coursework
101	Knowledge of obligations for reporting illegal, unethical, or unprofessional behaviors (e.g., fraud, abuse, neglect)	Degree coursework, jurisprudence / ethics exams
102	Knowledge of state and federal laws, rules, regulations, and industry standards set by state and accrediting bodies (e.g., state licensing entities, Joint Commission, CARF, CMS)	Jurisprudence / ethics exams, board and committee work
103	Knowledge of risk guidelines (e.g., policies and procedures, incident reports)	Board and committee work
107	Knowledge of socio-cultural issues that impact patient/client management (e.g., language differences, ethnicity, customs, demographics, religion)	Degree coursework
108	Knowledge of socioeconomic factors that impact patient/client management (e.g., social status, economic status, support system)	Degree coursework
109	Knowledge of health information technology (e.g., electronic medical records, telemedicine)	N/A
110	Knowledge of teaching and learning theories and techniques	Degree coursework, teaching
111	Knowledge of health behavior change models (e.g., social cognitive theory, health belief model)	Degree coursework
112	Knowledge of communication strategies	Degree coursework
113	Knowledge of literature access techniques	Degree coursework, professional writing / research / publishing
116	Active listening - Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times	Clinical education / field work, supervised clinical practice (foreign educated), residencies / fellowships, serving as a clinical instructor
117	Speaking - Talking to others to convey information effectively	Clinical education / field work, supervised clinical practice (foreign educated), teaching, serving as a clinical instructor
118	Reading Comprehension - Understanding written sentences and paragraphs in work related documents	Degree coursework
119	Critical Thinking - Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems	Degree coursework, clinical education / field work, residencies / fellowships
120	Social Perceptiveness - Being aware of others' reactions and understanding why they react as they do	Clinical education / field work

Table 15. (Continued)

Statement Number	Statement Text	Activity
121	Time Management - Managing one's own time and the time of others	Clinical education / field work, supervised clinical practice (foreign educated), residencies / fellowships
122	Coordination - Adjusting actions in relation to others' actions	Clinical education / field work, supervised clinical practice (foreign educated)
123	Writing - Communicating effectively in writing as appropriate for the needs of the audience	Degree coursework
124	Active Learning- Understanding the implications of new information for both current and future problem solving and decision-making	Degree coursework, clinical education / field work, residencies / fellowships
125	Persuasion – Persuading others to change their minds or behavior	N/A
126	Negotiation – Bringing others together and trying to reconcile difference	N/A
127	Service Orientation — Actively looking for ways to help people	N/A

This task was exploratory in nature; to provide a starting point for further investigations by FSBPT. One significant limitation to the judgment-based approach we used here is that it was often difficult for the SMEs to judge whether one of the above activities commonly covered and/or assessed the knowledge and skill requirements. There might be significant variability across schools, employers, or jurisdictions in the content and conduct of these activities. Thus, the SMEs had to rely on their own experience to make these decisions. Another limitation of this approach is that the criteria for the linkages were not absolute. For example, some of the linkages reflected in Table 15 might only reflect that the knowledge, for example, is covered to some unknown extent (e.g., an entire course, part of a course). Other linkages might reflect direct and standardized assessment of competence in that area. To address these limitations, should FSBPT be interested in further exploring this sort of linkage activity, one consideration would be to involve relevant stakeholders (e.g., licensing boards, CAPTE) in discussions about whether it is possible or even necessary to standardize these activities to ensure entry level PTs and PTAs possess these important but difficult-to-test knowledge and skill requirements. In addition, a great deal of information could be garnered through a document review (e.g., course curricula for all accredited PT and PTA programs) to make the judgments more objective. It would also allow FSBPT to better estimate how commonly the knowledge and skill requirements are covered by each of these methods. Regardless of the approach FSBPT decides to take, much more groundwork is needed in partnership with other entities to fully assess the extent to which there are mechanisms, outside of the licensure exam, for ensuring PTs and PTAs have acquired all of the critical but difficult-to-test knowledge and skill requirements.

Linkage Exercise: Process and Results

An additional step in this process to ensure the validity of the results was a linkage exercise. In the linkage exercise, Task Force members and additional SMEs were asked to indicate the knowledge and skills required for performing work activities effectively. The relevance of each knowledge statement to each work activity category was judged using a dichotomous 'required' versus 'not required' decision. Such linkage information is valuable for operationalizing the knowledge and skill requirements, as it indicates how the knowledge and skill requirements is used on the job (Baranowski & Anderson, 2005). The results of the linkage exercise: (a) ensure that no knowledge areas made it on the blueprint that could not be demonstrably linked to work activities and (b) provide information to facilitate item writing efforts.

As the linkage judgments were made at the level of each individual work activity and knowledge and skill requirements statement, the number of judgments in the entire matrix was 24,892 (196 WAs by 127 KSRs). If each judgment required only two seconds, this would still require an individual to commit 14 hours to complete the task. As this was an unrealistic amount of time to expect volunteers to dedicate to a task of this nature, the linkage matrix was divided into six parts so that each individual linked approximately 21 knowledge and skill requirements to all 196 work activities. Each portion of the matrix was completed by five volunteers, so in the end, every cell in the combined matrix was judged by five SMEs. SMEs entered their judgments directly into Excel spreadsheets.

Though an attempt was made to provide clear instructions to SMEs so that all respondents would share a similar frame-of-reference and threshold for indicating a linkage between a work activity and a knowledge or skill requirement, a review of the data suggested that some judges maintained a fairly lenient threshold for declaring a link. Therefore, when reviewing the data to declare linkages between work activities and knowledge and skill requirements, a fairly strict threshold was established requiring four of the five judges to indicate a link in order for a linkage to be valid.

After dropping work activities that did not meet the criticality threshold or that were otherwise declared not critical at entry-level, two knowledge and skill requirements were dropped due to the fact that their most directly associated work activities had been dropped. Specifically, "Knowledge of applications and adjustments, indications, contraindications, and precautions of light modalities (e.g., laser, infrared, ultraviolet)" was dropped largely because the work activities "Perform monochromatic infrared agent procedures (e.g., Anodyne®)," "Perform phototherapy (laser light) procedures," and "Perform ultraviolet light procedures" were omitted from the final critical work activities list. Similarly, "Knowledge of applications, indications, contraindications, and precautions of hydrotherapy (e.g., pulsed lavage, whirlpool)" was dropped largely because the work activities "Perform hydrotherapy procedures using pulsatile lavage" and "Perform hydrotherapy procedures using whirlpool tanks" were omitted from the final critical work activities list.

Because the linkage results would require hundreds of pages to print, they are not reproduced in this report. The raw linkage data has been provided to FSBPT so that they can use the linkage data for future purposes. For example, one very likely use of the linkage data will be to provide guidance to item writers. Providing the work activities linked to each knowledge area can help item writers generate ideas for content.

Linkage data are also valuable in the development of simulations and other assessments of performance. Specifically, should FSBPT wish to explore alternate assessment formats in the future, it would be possible to use the linkage data in much the same way as with NPTE item writers. This would likely be of the greatest benefit in assessing skills or the more abstract knowledge areas not well-suited to testing in a multiple choice format. For example, if it were desired to develop a simulation that would assess licensure applicants' "Knowledge of teaching and learning theories and techniques," a simulation of one of the work activities linked to this knowledge would be recommended (e.g., Educate the patient/client about current condition and health status (e.g., treatment outcomes, plan of care, risk and benefit factors) or Educate the patient/client and caregiver on lifestyle and behavioral changes to promote wellness (e.g., nutrition interventions, physical activity, tobacco cessation)).

Final Test Blueprint Categories and Weights

During the Task Force meeting, the Task Force members completed the test blueprint exercise. As presented in Appendix E, this exercise was an independent judgment completed by each Task Force member. Specifically, Task Force members were required to distribute 100 percentage points across the different major topic areas on the test blueprint. When making their judgments, they were reminded to consider the following information:

- The final list of knowledge and skill requirements retained for inclusion on the NPTE and the KSR survey results
- The work activities survey results
- The demographic results (the sample that contributed to the survey)
- Their own experience and knowledge of the profession
- The breadth of content for each of the major topic areas

Task Force members then spent approximately 20 minutes working independently, distributing 100 percentage points across the major system categories. Judgments were then submitted to project staff and entered into a spreadsheet that was projected for the entire group to see. The group facilitator then led a discussion of each topic area, noting the range of points allocated to that category by the panel members, and asking participants to share the thoughts that led them to allocate their chosen number of points to that category. After this process was completed for every topic area, the Task Force submitted revised judgments. The average percentage allocated to each topic area across panel members was then established as the weight for that topic area. As a final opportunity for questions and discussion, the results were projected to the group who were asked to concur with the resulting weights. Next, a similar process was followed to establish sub-system weights (i.e., *Data Collection*, *Diseases/Conditions that Impact Effective Treatment* and, *Interventions*) for the systems with multiple sub-topic areas. Within each system, Task Force members again allocated 100 points to the two or three sub-system topic areas. The determination at this level was how to divide the total number of points at the system level into the sub-system topics. For example, they might have assigned 30% of the musculoskeletal system questions to *Data Collection*, 40% to *Diseases/Conditions that Impact Effective Treatment*, and 30% to *Interventions*.

Following the Task Force meeting, the resulting PT and PTA test blueprints were shared with the Oversight Panel. The Oversight Panel reviewed the two test blueprints. Differences on the test blueprints could have resulted from a number of factors, including the different aspects of patient care for entry-level PTs and PTAs; different Task Forces; and minor adjustments in the procedures for the two Task Forces. For example, the PT Task Force spent a greater amount of time discussing medical conditions associated with each system. The PT Task Force also spent more time than the PTA Task Force discussing the test development process. Following their review, the Oversight Panel increased the amount of weight in the 'Musculoskeletal System' from 22.1% to 26.0% and increased the amount of weight in the 'Neuromuscular and Nervous Systems' from 20.0% to 22.1%. Some of the smaller system categories were decreased approximately one percentage point each (e.g., the amount of weight in the 'Metabolic and Endocrine Systems' was reduced from 4.6% to 3.8%).

Table 16 presents the final test blueprint as adopted by the Oversight Panel. Appendix I includes descriptions of these blueprint categories. The first column of Table 16 presents the broad (system) level topic area and the sub-system level topic areas. The second column indicates the target percentage of the test that will be represented by test questions in each topic area. For example, 16.3% of the test will consist of items representing knowledge of the *Cardiovascular, Pulmonary, and Lymphatic Systems*. The 26.9% for *Cardiovascular/Pulmonary and Lymphatic Systems: Data Collection* indicates that 26.9% of the *Cardiovascular/Pulmonary and Lymphatic Systems* will be represented by knowledge of *Data Collection*.

The third column indicates the target number of items that will be drawn from each topic area. At the system level, the target number of items is the product of 150 (the total number of scored questions on the NPTE) and the percentage weight, rounded to the nearest integer. The sub-system weights are the product of 150, the system percentage weight, and the sub-system percentage weight, rounded to the nearest integer. There were a few instances where following traditional rounding rules resulted in a discrepancy between the target number of items at the system level and the sum of the target number of items at the sub-system levels. Specifically, the *Integumentary System* would have had eight items if the traditional rounding rules (5.0% * 150 = 7.5, which would round to 8) had been followed. Following the procedure used to calculate the target number of items at the sub-system level would have indicated two items in *Data Collection*', two items in *Diseases/Conditions that Impact Effective Treatment*, and three items in *Interventions*, which sums to seven. Therefore, the target number of items for the *Integumentary System* was set at seven. A similar result was observed with the *Gastrointestinal System* and the *Genitourinary System*. To avoid the sum of the target number of items exceeding 150, it was necessary to make similar adjustments in these system categories.

The final column in Table 16 indicates a suggested range around the target number of items to be drawn from each topic area on each assembled test form. Several options for establishing item ranges were explored in an effort to afford FSBPT and the FSBPT exam committees some flexibility in assembling test forms, while ensuring form to form differences in the number of items drawn from each topic area would not exceed some reasonable and meaningful thresholds.

Table 16: PTA Test Blueprint

Topic Area	%	# Items	Range
CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS	**16.30%**	**25**	**23 – 26**
Physical Therapy Data Collection	26.9%	7	6 – 7
Diseases/Conditions that Impact Effective Treatment	31.3%	8	7 – 8
Interventions	41.8%	10	10 – 11
MUSCULOSKELETAL SYSTEM	**26.00%**	**39**	**37 – 41**
Physical Therapy Data Collection	32.5%	13	12 – 13
Diseases/Conditions that Impact Effective Treatment	27.4%	11	10 – 11
Interventions	40.1%	15	15 – 17
NEUROMUSCULAR & NERVOUS SYSTEMS	**22.10%**	**33**	**31 – 35**
Physical Therapy Data Collection	27.4%	9	8 – 10
Diseases/Conditions that Impact Effective Treatment	31.5%	10	10 – 11
Interventions	41.1%	14	13 – 14
INTEGUMENTARY SYSTEM	**5.00%**	**7**	**7 – 9**
Physical Therapy Data Collection	30.4%	2	2 – 3
Diseases/Conditions that Impact Effective Treatment	31.7%	2	2 – 3
Interventions	37.9%	3	2 – 3
METABOLIC & ENDOCRINE SYSTEMS	**3.80%**	**6**	**5 – 7**
Diseases/Conditions that Impact Effective Treatment	71.4%	4	4 – 5
Interventions	28.6%	2	1 – 2
GASTROINTESTINAL SYSTEM	**1.50%**	**2**	**2 – 3**
Diseases/Conditions that Impact Effective Treatment	52.9%	1	1 – 2
Interventions	47.1%	1	1 – 2
GENITOURINARY SYSTEM	**1.80%**	**2**	**2 – 3**
Diseases/Conditions that Impact Effective Treatment	46.7%	1	1 – 2
Interventions	53.3%	1	1 – 2
SYSTEM INTERACTIONS	**3.30%**	**5**	**4 – 6**
Diseases/Conditions that Impact Effective Treatment	100%	5	4 – 6
EQUIPMENT & DEVICES	**6.50%**	**10**	**9 – 11**
THERAPEUTIC MODALITIES	**8.00%**	**12**	**11 – 13**
SAFETY & PROTECTION	**2.50%**	**4**	**3 – 4**
PROFESSIONAL RESPONSIBILITIES	**1.80%**	**3**	**2 – 3**
RESEARCH & EVIDENCE-BASED PRACTICE	**1.50%**	**2**	**2 – 3**

Rounding Approach

The first approach that was considered was to calculate the *unrounded* number of items that would be drawn from each content area based on the agreed upon final blueprint percentage, and then round this value up and down to yield a one-item range for each broad (system level) topic area. For example, the final percentage of items on the PTA examination representing the *Neuromuscular and Nervous Systems* is 22.1%, which when multiplied by 150 items yields an unrounded 33.15 items. Rounding this value up and down would suggest the number of items on any test form should be at least 33, but no more than 34. It quickly became clear that this approach would yield a disproportionately high amount of flexibility for smaller topic areas than for larger topic areas. (There is a much greater relative difference between three items and four items, than between 33 items and 34 items.)

Standard Error of the Mean Approach

Next, an approach that would incorporate the standard errors of the Task Force members' judgments from the test blueprint exercise was explored. Specifically, when Task Force members provided their final judgments, they indicated a percentage for each topic area. With regard to the *Cardiovascular/Pulmonary and Lymphatic Systems*, most of the judges allocated between 15 and 20 percentage points to these systems as a broad topic area. The standard error of the mean across judges for each topic area was used to establish ranges around the average item numbers. This approach had the opposite problem as the "round up and round down" approach described in the previous paragraph. Using the standard error, the larger topic areas resulted in very large item ranges (the *Musculoskeletal System* would have contributed anywhere between 55 and 68 items to the PT examination), whereas the smaller topic areas resulted in very small item ranges (the *Genitourinary System* would contribute either three or four items to each form of the PT examination). Thus, the standard error approach could result in large form to form differences for some topic areas but very small form to form differences for other topic areas.

Item Range Approach

At this point, it became apparent that the preferred approach would provide larger ranges for the large topic areas and smaller ranges for the small topic areas. To examine the distribution of category sizes, the percentage allocation for each major topic area was plotted on the PT blueprint. We differentiated four levels: very small (topic areas that comprise less than 3% of the NPTE); small (between 3% and 10% of the NPTE); medium (greater than 10% but less than 20% of the NPTE); and, large (greater than 20% of the NPTE). A one-item range was assigned to the *very small* topic areas, a two-item range was designated around the *small* topic areas, a three-item range was allotted to the lone *medium* topic area (Cardiovascular/Pulmonary and Lymphatic), and a four-item range was assigned to the two *large* topic areas.

The minimum number of items to be recommended in any system was calculated by dividing the desired item range by two, *subtracting* this value from the product of 150 and the blueprint percentage weight, and rounding to the nearest integer. The maximum number of items to be recommended in any system was calculated by dividing the desired item range by two, *adding* this value from the product of 150 and the blueprint percentage weight, and rounding to

the nearest integer. For example, *Research and Evidence-Based Practice* is a very small topic area, according to the conventions described in the previous paragraph, and shall have a suggested range of one item. The minimum number of suggested items is:

$$(1.5\% * 150) - \frac{1}{2} = 1.75,$$

which rounds to 2. The maximum number of suggested items is:

$$(1.5\% * 150) + \frac{1}{2} = 2.75,$$

which rounds to 3.

The above process was carried out at the system level. At the sub-system level, the minimum number of suggested items was calculated by multiplying the sub-system weight by the system minimum number of suggested items and rounding the result to the nearest integer. And, the maximum number of suggested items at the sub-system level was calculated by multiplying the sub-system weight by the system maximum number of suggested items and rounding the result to the nearest integer. For example, the minimum and maximum number of items suggested for the *Neuromuscular and Nervous Systems* are 31 and 35, respectively. The *Interventions* sub-system weight is 41.1%. As a result, the suggested minimum number of *Neuromuscular and Nervous Systems: Interventions* items would be:

$$(41.1\% * 31) = 12.74,$$

which rounds to 13. The suggested maximum number of *Neuromuscular and Nervous Systems: Interventions* items would be:

$$(41.1\% * 35) = 14.38,$$

which rounds to 14.

Following this process, there were instances of sub-system level topic areas where the range would have been zero. For example, because some systems have ranges as small as one item, sub-systems such as *Gastrointestinal System: Interventions* would have minimum *and* maximum numbers of items equal to one. In these situations, the calculated results were amended so that all system and sub-system level topic areas would have ranges of at least one item.

Implementation and Conclusions

This section describes the final meeting with the policy group and provides some conclusions and thoughts for implementation.

Policy Group Review

Prior to implementing the new test blueprints that were derived from this effort, FSBPT convened the Policy Group in September 2011. HumRRO staff facilitated the meeting, wherein the Policy Group reviewed the practice analysis process and results, and considered the implications of the results in light of current trends in the profession.

The Policy Group asked a number of probing questions concerning the process and the rationale behind many of the decisions that were made. For example, the Policy Group had been provided with a brief description of the practice analysis methods and key decisions, along with numerous tables detailing the results of the practice analysis. They noted that in the final report, it would be beneficial to provide additional information beyond what they had been provided (such as our reasoning for assigning practice analysis surveys in the manner that we did). The Policy Group also requested that the final report provide additional information regarding the representativeness of the survey respondents and the adequacy of the response rate. As described earlier, there were some comparison data for select background and experience characteristics, but ultimately there is no national database that describes the experience and characteristics of the entire population of PTs and PTAs.

The Policy Group also made many suggestions to clarify the presentation of information in the results of the practice analysis, and in how to interpret and use the results of the practice analysis. The Policy Group pointed out the apparent similarity between the PT and PTA test blueprints. As the categorizing structure is very similar, and many of the knowledge statements are similar or identical, it might appear that the PT and PTA tests would have a significant amount of overlap. This concern is addressed in part by differences in blueprint category definitions and descriptions (compare Appendix I of the PT report with Appendix I of this report), and is also addressed through differences in the NPTE test purpose statement and candidate materials. Finally, item writers and reviewers take into account the depth of knowledge appropriate for each content area on each test (i.e., NPTE PT and NPTE PTA). Beyond these suggestions and clarifying questions, the Policy Group did not express any major concern with the practice analysis results or the new test blueprints.

Policy Group members also had recommendations for the FSBPT Board of Directors concerning disseminating the results and demonstrating the value and benefit of the information gathered during the practice analysis beyond the primary purpose of reviewing and updating the NPTE test blueprints. Specifically, the Policy Group commented that a wealth of information was collected during the PT and PTA practice analyses, and emphasized that various groups within the physical therapy profession might find the information helpful. The Policy Group recommended sharing the information with other professional groups as the data collected here might help those groups address challenges and answer questions they might have.

Conclusions

At a general level, the new test blueprints are highly similar to the blueprints developed in 2006. The general organizing framework of the existing test blueprint was carried forward and maintained throughout this process. Some new content will be introduced when the new test blueprint goes into effect in 2013 (e.g., “Knowledge of pharmacological management of the

metabolic and endocrine systems" and "Knowledge of the function and implications and related precautions of intravenous lines, tubes, catheters, and monitoring devices"). Other content will not be included on the NPTE beginning in 2013 (e.g., Knowledge of teaching and learning strategies, theories, and techniques). Nevertheless, the majority of the changes are quantitative changes where some areas will carry slightly more weight than they do now, while other areas will carry slightly less weight. For a comparison of the number of scored questions drawn from each content area under the existing test blueprints and the new test blueprints, see Table 17.

Table 17: Comparison of New and Existing PTA Test Blueprints

Topic Area	# Items 2013-2017	# Items 2008-2012
CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS	**25**	**19**
Clinical Application of Physical Therapy Principles and Foundational Sciences	--	10
Physical Therapy Data Collection	7	4
Diseases/Conditions that Impact Effective Treatment	8	--
Interventions	10	5
MUSCULOSKELETAL SYSTEM	**39**	**32**
Clinical Application of Physical Therapy Principles and Foundational Sciences	--	15
Physical Therapy Data Collection	13	9
Diseases/Conditions that Impact Effective Treatment	11	--
Interventions	15	8
NEUROMUSCULAR & NERVOUS SYSTEMS	**33**	**30**
Clinical Application of Physical Therapy Principles and Foundational Sciences	--	14
Physical Therapy Data Collection	9	7
Diseases/Conditions that Impact Effective Treatment	10	--
Interventions	14	9
INTEGUMENTARY SYSTEM	**7**	**9**
Clinical Application of Physical Therapy Principles and Foundational Sciences	--	4
Physical Therapy Data Collection	2	2
Diseases/Conditions that Impact Effective Treatment	2	--
Interventions	3	3
METABOLIC & ENDOCRINE SYSTEMS	**6**	**6**
Clinical Application of Physical Therapy Principles and Foundational Sciences	--	3
Physical Therapy Data Collection	--	1
Diseases/Conditions that Impact Effective Treatment	4	--
Interventions	2	2
GASTROINTESTINAL SYSTEM	**2**	**2**
Clinical Application of Physical Therapy Principles and Foundational Sciences	--	2
Diseases/Conditions that Impact Effective Treatment	1	--
Interventions	1	--
GENITOURINARY SYSTEM	**2**	**--**
Diseases/Conditions that Impact Effective Treatment	1	--
Interventions	1	--

Table 17: (Continued)

SYSTEM INTERACTIONS	**5**	**11**
Clinical Application of Foundational Sciences	--	**11**
Diseases/Conditions that Impact Effective Treatment	5	--
EQUIPMENT & DEVICES	**10**	**9**
THERAPEUTIC MODALITIES	**12**	**13**
SAFETY & PROTECTION	**4**	**12**
PROFESSIONAL RESPONSIBILITIES	**3**	
TEACHING & LEARNING	--	**4**
RESEARCH & EVIDENCE-BASED PRACTICE	**2**	**3**

Note that within each system, the sub-headings moving forward differ to some extent from those under the existing blueprint. Specifically, the sub-category *Clinical Application of Foundational Sciences* is eliminated, and the sub-category *Diseases/Conditions that Impact Effective Treatment* is introduced. Some of the knowledge that currently is tested under *Clinical Application of Foundational Sciences* is now covered in *Diseases/Conditions that Impact Effective Treatment* and some of the relevant knowledge is distributed throughout the remaining topic areas. Further, one current category (*Safety, Protection, & Professional Responsibilities*) is divided into two categories moving forward. Note that in Table 17 any category that does not currently exist (or that will not be included moving forward) is indicated by a '--'.

Comparing the blueprint that currently exists with the blueprint moving forward, a general trend is that the larger system categories will increase while the smaller system categories will further contract. For example, the *Musculoskeletal System* is the largest current blueprint category with 32 items. Moving forward, it will continue to be the largest, but it will expand to 39 items. The *Cardiovascular/Pulmonary & Lymphatic Systems* and the *Neuromuscular and Nervous Systems* both increase under the new test blueprint, while *System Interactions*, and *Safety & Protection and Professional Responsibilities* are considerably decreased under the new test blueprint.

Some categories that will be significantly smaller also deserve mention. First, although *Teaching and Learning* is excluded from the new test blueprint, knowledge related to instructing patients in the performance of interventions will still be tested. But, instead of categorizing such items as *Teaching and Learning*; they will be categorized under the relevant *Intervention* sub-category.

In closing, the 2011 PTA practice analysis update resulted in a NPTE blueprint that is a valid representation of entry-level PTA requirements that are reasonably testable on a well-constructed multiple-choice examination. The updated test blueprint reflects the input of a large and representative sampling of physical therapists and the careful review and consideration by stakeholder groups. These test blueprints will be easy to use for item writers, test candidates, and educators. We are pleased that FSBPT has had success with the blueprints developed in 2006, and we anticipate these updated blueprints will be received equally well or better than the 2006 versions.

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Appendix A

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Appendix B

Sample Letters from Pilot and Operational Survey Administrations

March 3, 2011

«AddressBlock»

Dear «GreetingLine»,

The Federation of State Boards of Physical Therapy (FSBPT) is responsible for developing and maintaining the national licensure examinations for physical therapists and physical therapist assistants. The examinations are revised periodically so that their content is current and valid. An important part of the revision process involves collecting information from practicing clinicians concerning what tasks they perform and what they need to know to perform those tasks effectively.

In the coming months, we will be administering a survey to a national sample of physical therapists and physical therapist assistants to obtain their input. Prior to the national survey, FSBPT's contractor, the Human Resources Research Organization (HumRRO), conducts a smaller scale pilot test of the survey. You have been randomly selected to participate in the pilot survey. We ask that you complete the survey and provide feedback regarding the survey content, layout, and functionality. Assuming there are few major changes to the survey as a result of the pilot test, your responses to the survey questions will be included with the responses from the national sample.

Please go to the following Internet site to complete the survey:

https://apps.humrro.org/fsbpt/

When you enter the site, you will be asked to enter an access code. Your access code is:

[Insert Access Code Here]

Instructions for completing the survey are provided at the beginning of the survey. The survey should take approximately one hour to complete. If you cannot finish the survey in one session, click 'Continue Later' at any point. Selecting this option will enable you to return to the survey at the point you left off.

In appreciation for your time completing the survey, FSBPT will make a donation from a fund of $10,000 to your choice of one of the following nonprofit organizations: Foundation for Physical Therapy; Samaritan's Feet; Nature Conservancy; or Humane Society. You will be able to select the organization upon completing the survey.

Thank you in advance for providing your input, which will allow continued development of the licensure exams to ensure the competence of physical therapists and physical therapist assistants entering the profession.

Sincerely,

Margaret Donohue, PT
President, Federation of State Boards of Physical Therapy

April 28, 2011

«AddressBlock»

Dear «GreetingLine»,

The Federation of State Boards of Physical Therapy (FSBPT) is responsible for developing and maintaining the national licensure examinations for physical therapists and physical therapist assistants. The examinations are revised periodically so that their content is current and valid. An important part of the revision process involves collecting information from practicing clinicians concerning what tasks they perform and what they need to know to perform those tasks effectively.

For the next several weeks, the Human Resources Research Organization (HumRRO) is conducting a survey of Physical Therapists and Physical Therapist Assistants to obtain the data FSBPT needs to update and validate the licensure exam. You have been randomly selected to participate in this survey. Your responses will be completely confidential. Your answers will be merged with those from colleagues across the country, and will only be used in aggregated form to develop a comprehensive and up-to-date picture of the knowledge and skills needed by those in our profession.

Please go to the following Internet site to complete the survey:

https://www.humrro.org/apps/fsbpt/

When you enter the site, you will be asked to enter an access code. Your access code is:

[Insert Access Code Here]

Instructions for completing the survey are provided at the beginning of the survey. The survey should take approximately one hour to complete. If you cannot finish the survey in one session, click 'Continue Later' at any point. Selecting this option will enable you to return to the survey at the point you left off.

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Thank you in advance for providing your input, which will allow continued development of the licensure exams to ensure the competence of physical therapists and physical therapist assistants entering the profession.

Sincerely,

Margaret Donohue, PT
President, Federation of State Boards of Physical Therapy

Appendix C

Results of Work Activity Survey

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
PATIENT/CLIENT ASSESSMENT								
Information Gathering & Synthesis								
1	Interview patients/clients, caregivers, and family to obtain patient/client history and current information (e.g., medical, surgical, medications, social, cultural, economic) to...							
1a	...review prior and current level of function	698	3.91	1.38	656	94%	4.44	0.70
1b	...establish general health status (e.g., fatigue, fever, malaise, unexplained weight change)	697	4.07	1.36	654	94%	4.47	0.70
2	Review medical records (e.g., lab values, diagnostic tests, specialty reports, narrative, consults, physical therapy documentation) prior to carrying out the PT plan of care	697	4.20	1.15	671	96%	4.53	0.68
3	Gather information/discuss client/patient's current health status with interprofessional/interdisciplinary team members (e.g., teacher, physician, rehabilitation member)	698	3.78	1.34	658	94%	4.36	0.74
4	Identify signs/symptoms of change in patient/client's health status that require intervention by physical therapist	696	3.95	1.15	680	98%	4.59	0.63
5	Identify signs/symptoms of change in patient/client's health status that require intervention by interprofessional/interdisciplinary team members	698	3.63	1.38	667	96%	4.56	0.66
Systems Review								
6	Check patient's/client's current affect, cognition, communication, and learning style (e.g., ability to make needs known, consciousness, orientation, expected emotional/behavioral responses, learning preferences)	697	4.01	1.29	660	95%	4.35	0.77
7	Recognize changes in status of the...							
7a	...patient/client's quality of speech, hearing, vision (e.g., dysarthria, pitch/tone, use corrective lenses, use of hearing aids)	699	3.45	1.55	638	91%	4.27	0.82
7b	...vestibular system (e.g., dizziness, vertigo)	697	3.37	1.53	642	92%	4.24	0.84
7c	...gastrointestinal system (e.g., difficulty swallowing, heartburn, indigestion, change in appetite/diet)	698	2.61	1.72	562	81%	4.03	0.90
7d	...genitourinary system (e.g., frequency, volume, urgency, incontinent episodes)	697	2.27	1.79	505	72%	3.90	0.95
7e	...genital reproductive system (e.g., sexual and/or menstrual dysfunction)	697	0.71	1.27	225	32%	3.53	1.09
7f	...cardiovascular/pulmonary system (e.g., blood pressure, heart rate)	697	3.79	1.39	663	95%	4.54	0.68
7g	...integumentary system (e.g., presence of scar formation, skin integrity, edema)	698	3.95	1.24	669	96%	4.38	0.75
7h	...musculoskeletal system (e.g., gross symmetry, strength, weight, height, range of motion)	698	4.37	0.97	680	97%	4.49	0.70
7i	...neuromuscular system (e.g., gross coordinated movements, motor function, locomotion)	698	4.27	1.04	677	97%	4.51	0.67

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
Data Collection								
Cardiovascular and Pulmonary								
8	Perform tests and measures of...							
8a	...cardiovascular function (e.g., blood pressure, heart rate, heart sounds)	698	3.57	1.53	655	94%	4.40	0.76
8b	...pulmonary function (e.g., respiratory rate, oxygen saturation, breathing patterns, breath sounds, chest excursion)	697	3.51	1.71	612	88%	4.46	0.73
8c	...perfusion and gas exchange (e.g., airway protection, pulse oximetry)	698	2.95	1.98	535	77%	4.41	0.76
8d	...peripheral circulation (e.g., peripheral pulses, capillary refill, blood pressure in upper versus lower extremities)	698	1.82	1.70	466	67%	3.98	0.93
8e	...critical limb ischemia (e.g., skin perfusion pressure, pulse volume recordings)	698	1.27	1.63	335	48%	3.90	0.98
8f	...physiological responses to position change (e.g., orthostatic hypotension, skin color, blood pressure, heart rate)	697	3.38	1.60	631	91%	4.34	0.78
8g	...aerobic capacity under maximal and submaximal conditions (e.g., gait speed, treadmill testing, cadence, numbers of stairs climbed, metabolic equivalents)	698	3.02	1.83	574	82%	4.15	0.85
Anthropomorphic								
9	Perform tests and measures of...							
9a	...body composition (e.g., percent body fat, lean muscle mass)	698	0.48	0.97	192	28%	3.11	1.07
9b	...body dimensions (e.g., height, weight, girth, limb length, head circumference/shape)	699	1.25	1.40	395	57%	3.32	0.99
10	Quantify edema (e.g., palpation, volume test, circumference)	699	2.20	1.61	543	78%	3.75	0.91
Arousal, Attention, & Cognition								
11	Perform tests and measures of...							
11a	...attention and cognition (e.g., ability to process commands)	698	3.24	1.87	576	83%	4.11	0.87
11b	...patient's/client's ability to communicate (e.g., expressive and receptive skills, following instructions)	697	3.42	1.80	593	85%	4.14	0.85
11c	...arousal and orientation to time, person, place, and situation	698	3.09	1.88	569	82%	4.12	0.86
11d	...recall (including memory and retention)	696	3.08	1.88	563	81%	4.08	0.86
Nerve Integrity								
12	Perform tests and measures of...							
12a	...neural provocation (e.g., tapping, tension/stretch)	699	1.98	1.79	464	66%	3.73	0.92
12b	...cranial nerve integrity (e.g., facial asymmetry, oculomotor function, hearing)	699	1.07	1.48	328	47%	3.72	0.94

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
12c	...peripheral nerve integrity (e.g. sensation, strength)	699	2.76	1.80	546	78%	4.01	0.86
12d	...spinal nerve integrity (e.g., dermatome, myotome)	695	1.53	1.63	415	60%	3.85	0.90
Environmental & Community Integration/Reintegration (Home, Work, Job, School, Play, & Leisure)								
13	Collect data on client/patient's ability to perform activities of daily living (ADL) (e.g., bed mobility, transfers, household mobility, dressing, self-care)	697	4.18	1.27	659	95%	4.44	0.73
14	Collect data on ability to perform instrumental activities of daily living (IADL) (e.g., household chores, hobbies, money management)	698	3.08	1.81	572	82%	4.10	0.89
15	Collect data on ability to perform skills needed for integration or reintegration into the community, work, or school	697	3.24	1.71	605	87%	4.12	0.85
16	Collect data on barriers (e.g., social, economic, physical, environmental, work conditions and activities) to community, work, or school integration/reintegration	696	2.89	1.78	570	82%	4.02	0.89
17	Collect data on ability to participate in activities with or without the use of devices or equipment	694	3.89	1.39	656	95%	4.29	0.80
Ergonomics and Body Mechanics								
18	Perform tests and measures of...							
18a	...ergonomics and body mechanics during self-care, home, management, work, community, or leisure actions, tasks, or activities (e.g., how patient moves, whether patient aggravates the injury)	697	3.82	1.45	646	93%	4.29	0.78
18b	...postural alignment and position (static and dynamic)	698	4.15	1.27	662	95%	4.33	0.77
Functional Mobility, Balance, & Vestibular								
19	Perform tests and measures of...							
19a	...balance (dynamic and static) with or without the use of specialized equipment	696	4.33	1.00	678	97%	4.43	0.70
19b	...gait and locomotion (e.g. ambulation, wheelchair mobility) with or without the use of specialized equipment	698	4.53	0.88	679	97%	4.53	0.65
19c	...mobility during functional activities and transitional movements (e.g., transfers, bed mobility)	697	4.38	1.12	672	96%	4.51	0.68
19d	...vestibular function (e.g., peripheral dysfunction, central dysfunction)	697	2.44	1.77	540	77%	4.08	0.90
Integumentary Integrity								
20	Collect data on patient/client's activities, positioning, and postures that produce or relieve trauma to the skin	698	3.07	1.82	574	82%	4.24	0.83
21	Identify devices and equipment that produce or relieve trauma to the patient/client's skin	698	2.78	1.77	563	81%	4.16	0.86

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
22	Observe skin characteristics (e.g., blistering, continuity of skin color, dermatitis, hair growth, mobility, nail growth, sensation, temperature, texture, turgor)	699	3.40	1.62	615	88%	4.19	0.86
23	Collect data on wound characteristics (e.g., tissue involvement, depth, tunneling, burn degree)	699	1.34	1.57	383	55%	4.03	0.91
24	Observe scar tissue characteristics (e.g., banding, pliability, sensation, and texture)	698	2.12	1.75	507	73%	3.86	0.92
Joint Integrity & Range of Motion								
25	Perform tests and measures of...							
25a	...peripheral joint stability (e.g., ligamentous integrity, joint structure)	698	2.63	1.85	536	77%	4.05	0.85
25b	...spinal joint stability (e.g., ligamentous integrity, joint structure)	699	1.91	1.86	425	61%	4.03	0.84
25c	...peripheral joint mobility (e.g., glide, end feel)	698	2.71	1.85	542	78%	4.04	0.86
25d	...spinal joint mobility (e.g., glide, end feel)	698	1.70	1.84	388	56%	3.99	0.85
25e	...range of motion (e.g., functional and physiological)	699	4.34	0.99	672	96%	4.33	0.73
25f	...active and passive joint range of motion (e.g., goniometry)	699	4.22	1.07	677	97%	4.34	0.73
25g	...flexibility (e.g., muscle length, soft tissue extensibility)	699	4.10	1.29	655	94%	4.29	0.77
Motor Function								
26	Perform tests and measures of...							
26a	...muscle tone (e.g., hypertonicity, hypotonicity, dystonia)	699	2.87	1.69	595	85%	4.01	0.85
27	...muscle strength, power, and endurance (e.g., manual muscle test, isokinetic testing, dynamic testing)	699	3.70	1.45	638	91%	4.26	0.80
26b	...dexterity, coordination, and agility (e.g., rapid alternating movement, finger to nose)	699	2.34	1.70	551	79%	3.91	0.90
26c	...ability to initiate, modify and control movement patterns and postures (e.g., catching a ball, gait)	698	4.00	1.30	660	95%	4.27	0.78
26d	...ability to change movement performance with practice (e.g., motor learning)	698	3.56	1.52	634	91%	4.20	0.80
26e	...patient's need for assistance (e.g. during transfers, in the application of devices)	699	4.23	1.24	667	95%	4.46	0.71
Muscle Performance								
27	Perform tests and measures of...							
27	...muscle strength, power, and endurance (e.g., manual muscle test, isokinetic testing, dynamic testing)	699	3.70	1.45	638	91%	4.26	0.80
Neuromotor Development & Sensory Integration								
28	Perform tests and measures of...							
28a	...acquisition and evolution of motor skills	698	1.95	1.81	439	63%	3.85	0.86

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
28b	...sensorimotor integration	698	1.76	1.72	427	61%	3.81	0.89
28c	...developmental reflexes and reactions (e.g., asymmetrical tonic neck reflex, righting reactions)	698	1.34	1.64	361	52%	3.77	0.91
Reflex Integrity								
29	Perform tests and measures of...							
29a	...deep tendon/muscle stretch reflexes (e.g., quadriceps, biceps)	696	1.56	1.65	417	60%	3.65	0.94
29b	...superficial reflexes and reactions (e.g., cremasteric reflex, abdominal reflexes)	699	0.95	1.43	286	41%	3.66	0.96
29c	...upper motor neuron integrity (e.g., Babinski reflex, Hoffman sign)	698	0.99	1.29	352	50%	3.62	0.97
Pain & Sensory Integrity								
30	Perform tests and measures of...							
30a	...pain (e.g., location, intensity, characteristics, frequency)	697	4.46	1.21	650	93%	4.42	0.74
30b	...deep sensation (e.g., proprioception, kinesthesia, pressure)	698	2.93	1.80	560	80%	4.06	0.85
30c	...superficial sensation (e.g., touch, temperature discrimination)	698	2.91	1.74	583	84%	4.00	0.87
INTERVENTIONS								
31	Modify and/or progress treatment within the plan of care	696	4.34	0.94	679	98%	4.52	0.67
Procedural Interventions								
Therapeutic Exercise/Therapeutic Activities								
32	Train in aerobic capacity/endurance conditioning	697	3.89	1.54	637	91%	4.25	0.79
33	Train in balance, coordination, and agility activities	698	4.54	0.89	679	97%	4.47	0.67
34	Train in body mechanics and postural stabilization techniques	698	4.45	0.98	680	97%	4.45	0.69
35	Perform flexibility techniques	698	4.05	1.30	655	94%	4.24	0.81
36	Train in flexibility techniques	698	3.87	1.41	648	93%	4.23	0.82
37	Train in mobility techniques	697	4.35	1.07	673	97%	4.42	0.72
38	Train in fall prevention and fall recovery strategies	697	3.76	1.45	659	95%	4.49	0.71
39	Train in neuromotor techniques (e.g., movement pattern training, neuromuscular education or reeducation)	698	3.55	1.54	643	92%	4.19	0.80
40	Train in relaxation techniques	698	2.88	1.66	592	85%	3.91	0.91
41	Train in strength, power and endurance exercises	698	4.41	1.17	662	95%	4.37	0.73
42	Train in genitourinary management (e.g., pelvic floor exercises, bladder strategies)	697	1.33	1.58	388	56%	3.65	0.97
43	Train in gastrointestinal management (e.g., bowel strategies, positioning to avoid reflux)	699	0.73	1.23	245	35%	3.59	0.99

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
44	Administer prescribed oxygen during interventions	697	2.73	2.09	485	70%	4.43	0.77
45	Perform manual/mechanical airway clearance techniques (e.g., assistive cough, percussion, vibration, shaking)	698	0.53	1.05	198	28%	3.68	0.92
46	Train in manual/mechanical airway clearance techniques (e.g., assistive devices, assistive cough, incentive spirometer, flutter valve, percussion/postural drainage	699	0.58	1.14	200	29%	3.66	0.96
47	Perform techniques to maximize ventilation and perfusion (e.g., assistive cough, positioning)	699	0.80	1.28	262	37%	3.74	0.92
48	Train in breathing strategies (e.g., active cycle breathing, autogenic drainage, paced breathing, pursed lip breathing) and techniques to maximize ventilation and perfusion (e.g., assistive cough, positioning, pursed-lip breathing)	698	2.42	1.86	510	73%	4.06	0.90
49	Perform mechanical positioning for vestibular dysfunction	698	0.69	1.20	236	34%	3.73	0.90
50	Train in habituation/adaptation exercises for vestibular dysfunction (e.g., vestibuloccular reflex, position changes)	698	0.75	1.25	253	36%	3.77	0.91
Functional Training								
51	Train in the use of barrier accommodations or modifications (e.g. ramps, grab bars, raised toilet, environmental control units)	697	2.92	1.79	585	84%	4.11	0.86
52	Train in Activities of Daily Living (ADL) (e.g., bed mobility, transfers, household mobility, dressing, self-care)	699	3.88	1.52	649	93%	4.33	0.77
53	Train in community and leisure integration or reintegration (e.g., work/school/play)	698	2.41	1.76	530	76%	3.94	0.87
54	Train in Instrumental Activities of Daily Living (IADL) (e.g., household chores, hobbies, money management)	699	2.07	1.83	473	68%	3.85	0.92
37	Train in mobility techniques	697	4.35	1.07	673	97%	4.42	0.72
38	Train in fall prevention and fall recovery strategies	697	3.76	1.45	659	95%	4.49	0.71
55	Train in behavior modification and cognitive strategies	699	1.82	1.81	424	61%	3.84	0.95
Manual Therapy Techniques								
56	Perform manual lymphatic drainage	698	0.48	1.06	162	23%	3.65	1.00
57	Perform spinal manual traction	698	1.10	1.53	300	43%	3.76	0.90
58	Perform peripheral manual traction	696	1.07	1.50	301	43%	3.67	0.91
59	Perform soft tissue mobilization (e.g., connective tissue massage, therapeutic massage)	698	2.91	1.72	610	87%	3.85	0.93
60	Perform peripheral joint range of motion	698	3.82	1.55	633	91%	4.21	0.85
61	Perform peripheral mobilization/manipulation (thrust)	698	0.51	1.22	136	19%	3.64	0.99
62	Perform peripheral mobilization/manipulation (non-thrust)	697	1.26	1.74	294	42%	3.76	0.96

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
63	Perform spinal mobilization/manipulation (thrust)	698	0.32	0.99	86	12%	3.50	1.00
64	Perform spinal mobilization/manipulation (non-thrust)	697	0.78	1.46	192	28%	3.81	0.98
Devices & Equipment								
65	Apply and/or adjust...							
65a	...adaptive devices (e.g., utensils, seating and positioning devices, steering wheel devices)	698	1.90	1.86	434	62%	3.88	0.89
65b	...protective devices (e.g., braces, cushions, helmets, protective taping)	699	2.43	1.66	563	81%	3.88	0.90
65c	...supportive devices (e.g., compression garments, corsets, elastic wraps, neck collars, serial casts)	698	2.23	1.66	548	79%	3.89	0.90
65d	...orthotic devices (e.g., braces, casts, shoe inserts, splints)	697	2.77	1.51	625	90%	3.94	0.85
65e	...assistive devices (e.g., canes, crutches, walkers, wheelchairs, tilt tables, standing frames)	699	4.05	1.29	673	96%	4.33	0.77
65f	...prosthetic devices (e.g., lower extremity and upper-extremity)	697	1.60	1.51	487	70%	3.96	0.89
65g	...mechanical neuromuscular reeducation devices (e.g., weighted vests, therapeutic suits, body weight supported treadmill, proprioceptive taping)	699	0.95	1.46	279	40%	3.65	0.98
66	Train in use of...							
66a	...adaptive devices (e.g., utensils, seating and positioning devices, steering wheel devices)	698	1.47	1.73	367	53%	3.86	0.92
66b	...assistive devices (e.g., canes, crutches, walkers, wheelchairs, tilt tables, standing frames)	695	3.91	1.40	665	96%	4.32	0.76
66c	...orthotic devices (e.g., braces, casts, shoe inserts, splints)	697	2.50	1.59	594	85%	3.90	0.87
66d	...prosthetic devices (e.g., lower extremity and upper-extremity)	695	1.43	1.50	451	65%	3.90	0.92
66e	...protective devices (e.g., braces, cushions, helmets, protective taping)	696	1.98	1.68	503	72%	3.85	0.88
66f	...supportive devices (e.g., compression garments, corsets, elastic wraps, neck collars, serial casts)	697	1.90	1.66	499	72%	3.83	0.93
66g	...mechanical neuromuscular re-education devices (e.g., weighted vests, therapeutic suits, body weight supported treadmill, proprioceptive taping)	697	0.79	1.35	245	35%	3.69	0.98
Integumentary Repair & Protection Techniques								
67	Perform nonselective debridement (e.g., removal of nonselective areas of devitalized tissue)	699	0.30	0.82	111	16%	3.75	1.05
68	Perform selective enzymatic or autolytic debridement (e.g., removal of specific areas of devitalized tissue)	698	0.21	0.73	80	11%	3.90	1.01
69	Perform sharp debridement (e.g., removal of specific areas of devitalized tissue)	699	0.15	0.63	52	7%	3.79	1.14
70	Apply topical agents (e.g., cleansers, creams, moisturizers, ointments, sealants) and dressings (e.g., hydrogels, negative pressure wound therapy, wound coverings)	697	0.63	1.17	210	30%	3.69	1.00

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
71	Perform desensitization techniques (e.g., brushing, tapping, use of textures)	697	0.82	1.19	301	43%	3.61	0.97
72	Train desensitization techniques (e.g., brushing, tapping, use of textures)	698	0.75	1.15	283	41%	3.57	0.97
Therapeutic Modalities								
73	Perform biofeedback therapy (e.g., relaxation techniques, muscle reeducation, EMG)	699	1.72	1.73	425	61%	3.74	0.91
74	Perform iontophoresis	698	1.22	1.58	340	49%	3.78	0.94
75	Perform phonophoresis	697	0.86	1.41	249	36%	3.76	0.95
76	Perform electrical stimulation therapy (e.g., electrical muscle stimulation (EMS), TENS, functional electrical stimulation (FES))	697	3.18	1.84	598	86%	3.98	0.90
77	Perform cryotherapy procedures (e.g., cold pack, ice massage, vapocoolant spray)	697	3.45	1.70	615	88%	3.91	0.90
78	Train in cryotherapy procedures	698	2.41	1.95	500	72%	3.89	0.91
79	Perform hydrotherapy procedures using contrast baths/pools	697	0.53	1.12	187	27%	3.63	1.00
80	Train in hydrotherapy procedures using contrast baths/pools	699	0.40	0.91	161	23%	3.45	0.99
81	Perform hydrotherapy procedures using pulsatile lavage	698	0.18	0.66	73	10%	3.67	1.04
82	Perform hydrotherapy procedures using whirlpool tanks	698	0.38	0.94	138	20%	3.64	1.02
83	Perform infrared light agent procedures	699	0.34	0.97	108	15%	3.52	0.97
84	Perform monochromatic infrared agent procedures (e.g., Anodyne®)	699	0.27	0.83	91	13%	3.44	1.06
85	Perform phototherapy (laser light) procedures	699	0.26	0.89	74	11%	3.43	1.03
86	Perform ultraviolet light procedures	698	0.11	0.58	37	5%	3.27	1.15
87	Perform ultrasound procedures	698	2.75	1.81	574	82%	3.90	0.90
88	Perform diathermy procedures	697	0.80	1.51	193	28%	3.86	0.89
89	Perform dry heat thermotherapy procedures (e.g., Fluidotherapy)	698	0.31	0.96	96	14%	3.60	0.98
90	Perform hot pack thermotherapy procedures	697	3.20	1.84	584	84%	3.89	0.92
91	Train in hot pack thermotherapy procedures	698	2.12	1.90	468	67%	3.84	0.91
92	Perform paraffin bath thermotherapy procedures	698	0.67	1.18	246	35%	3.58	0.99
93	Train in paraffin bath thermotherapy procedures	696	0.52	1.06	195	28%	3.60	0.97
Mechanical Modalities								
94	Apply intermittent pneumatic compression	699	0.66	1.36	191	27%	3.70	0.88
95	Train patient/client in intermittent pneumatic compression	698	0.41	1.02	142	20%	3.65	0.92
96	Apply continuous passive motion (CPM) devices	699	1.30	1.51	393	56%	3.84	0.90
97	Train in continuous passive motion (CPM) devices	699	1.15	1.46	361	52%	3.83	0.92

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
98	Apply mechanical spinal traction	698	1.12	1.58	292	42%	3.97	0.83
99	Train in mechanical spinal traction	697	0.62	1.14	212	30%	3.72	0.90
100	Apply hyperbaric therapy	698	0.06	0.48	18	3%	3.50	0.99
101	Apply negative pressure wound therapy	697	0.09	0.52	35	5%	3.86	0.94
102	Train patient/client in negative pressure wound therapy	698	0.09	0.51	32	5%	3.50	1.05
Non-procedural Interventions								
Communication								
103	Discuss physical therapy evaluation findings, interventions, goals, prognosis, discharge planning, and plan of care with supervising physical therapist	697	4.09	0.98	687	99%	4.55	0.67
104	Discuss physical therapy evaluation findings, interventions, goals, prognosis, discharge planning, and plan of care with interprofessional/interdisciplinary team members (e.g., teacher, physician, rehabilitation member)	697	3.40	1.38	646	93%	4.31	0.76
105	Discuss physical therapy evaluation findings, interventions, goals, prognosis, discharge planning, and plan of care with patient/client and caregiver	694	3.89	1.12	681	98%	4.44	0.70
106	Provide written and oral information to the patient/client and/or caregiver	696	3.79	1.27	673	97%	4.37	0.77
Documentation								
107	Document data collection results	699	4.37	1.06	670	96%	4.51	0.71
108	Document intervention(s) and patient/client response(s) to intervention	699	4.62	0.71	683	98%	4.62	0.62
109	Document patient/client and caregiver education	699	4.24	1.01	681	97%	4.46	0.73
110	Document communication related to the patient's/client's care (e.g., supervising physical therapist, doctor, teacher, case manager)	698	4.01	1.06	682	98%	4.43	0.75
111	Provides information for billing and reimbursement	699	3.93	1.56	623	89%	4.40	0.80
112	Document disclosure and consent (e.g., disclosure of medical information, consent for treatment)	696	2.53	1.95	486	70%	4.25	0.89
Education								
113	Educate patient/client about current condition and health status (e.g., treatment outcomes, plan of care, risk and benefit factors)	698	4.19	1.08	677	97%	4.42	0.74
114	Educate caregivers about patient's/client's current condition and health status (e.g., treatment outcomes, plan of care, risk and benefit factors)	698	3.64	1.28	670	96%	4.30	0.75
115	Educate healthcare team about role of PTA in patient/client management	699	2.44	1.60	584	84%	3.94	0.92

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
116	Educate patient/client and caregiver on lifestyle and behavioral changes to promote wellness (e.g., nutrition interventions, physical activity, tobacco cessation)	699	3.35	1.43	655	94%	4.15	0.85
117	Educate community groups on lifestyle and behavioral changes to promote wellness (e.g., nutrition interventions, physical activity, tobacco cessation)	699	1.29	1.64	352	50%	3.86	0.94
Patient/Client and Staff Safety								
Emergency Procedures								
118	Implement emergency life support procedures	696	0.53	0.94	252	36%	4.33	0.84
119	Perform first aid	698	0.86	1.02	391	56%	4.08	0.93
120	Implement disaster response procedures	697	0.69	0.90	344	49%	4.15	0.90
Environmental Safety								
121	Perform risk assessment of the physical environment (e.g., barrier-free environment, outlets, windows, floors, lighting)	696	1.80	1.80	448	64%	4.10	0.89
122	Prepare and maintain a safe working environment for performing interventions (e.g., unobstructed walkways, equipment availability)	696	3.90	1.55	636	91%	4.41	0.78
123	Perform regular equipment inspections (e.g., modalities, assistive devices)	695	2.67	1.69	588	85%	4.26	0.85
Infection Control								
124	Perform activities using appropriate infection control practices (e.g., universal precautions, hand hygiene, isolation, airborne precautions)	698	4.51	1.21	672	96%	4.76	0.56
125	Create and maintain an aseptic environment for patient/client interaction	698	4.17	1.59	628	90%	4.69	0.61
Research & Evidence-Based Practice								
126	Search the literature for current best evidence	699	2.03	1.10	642	92%	3.66	0.88
127	Evaluate the quality of published data	696	1.43	1.20	512	74%	3.57	0.92
128	Integrate current best evidence, clinical experience, and patient values in clinical practice (e.g., clinical prediction rules, patient preference)	696	2.44	1.65	594	85%	3.75	0.93
129	Participate in research activities	697	0.49	0.88	217	31%	3.56	0.93
130	Compare intervention outcomes with published data	697	0.85	1.06	354	51%	3.49	0.95
Professional Responsibilities								
131	Assign tasks to other personnel (e.g., physical therapy aides) to assist with patient/client care	697	3.12	2.01	532	76%	3.77	1.02
132	Disclose financial interest in recommended products or services to patient/client	696	1.15	1.51	305	44%	3.49	1.01

Table C1. Results of Work Activities Survey

		Descriptive Statistics						
		Frequency			Importance			
PTA Work Activity Statements		*n*	*M*	*SD*	*n*	% Perf	*M*	*SD*
133	Communicate with the physical therapist when the expectations of the PTA are beyond their knowledge, skills, and abilities	697	2.24	1.49	612	88%	4.35	0.82
134	Report health care providers that are suspected to not perform their professional responsibilities with reasonable skill and safety to the appropriate authorities[!]	694	0.60	1.11	242	35%	4.33	0.87
135	Report suspected cases of abuse involving children or vulnerable adults to the appropriate authority	693	0.40	0.90	193	28%	4.50	0.76
136	Report suspected illegal or unethical acts performed by health care professionals to the relevant authority	694	0.36	0.89	165	24%	4.50	0.76
137	Advocate for public access to physical therapy and other healthcare services	689	1.06	1.34	377	55%	3.84	0.94
138	Read and evaluate the quality of professional journals, magazines, and publications to maintain currency of knowledge	696	1.72	1.07	594	85%	3.67	0.90
139	Determine own need for professional development (i.e., continued competence)	696	2.08	1.19	659	95%	4.08	0.87
140	Participate in learning and/or development activities to maintain the currency of knowledge, skills, and abilities	696	1.87	1.12	662	95%	4.10	0.85
141	Practice within the jurisdiction regulations and professional standards.	695	4.58	1.12	666	96%	4.66	0.67
142	Participate in professional organizations	693	0.95	1.32	366	53%	3.64	1.03

Note: Frequency response scale ranged from 0 (Never) to 5 (More than once a day). Respondents that provided a frequency rating greater than 0 were also asked to provide an importance rating. Importance response scale ranged from 1 (Unimportant) to 5 (Extremely Important). % Perf = the percentage of respondents indicating they perform a given work activity and rated the importance of that work activity.

Appendix D

Knowledge and Skill Requirements Survey Results

Table D1. Results of Work Activity Survey

	PTA Knowledge Statement	Descriptive Statistics: Importance *n*	*M*	*SD*
CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS				
Physical Therapy Data Collection				
1	Knowledge of cardiovascular/pulmonary system tests/measures, including outcome measures, and their applications according to current best evidence	822	3.33	0.95
2	Knowledge of anatomy and physiology of the cardiovascular/pulmonary system as related to tests/measures	822	3.56	0.93
3	Knowledge of movement analysis as related to the cardiovascular/pulmonary system (e.g., rib cage excursion)	822	3.40	0.96
Diseases/Conditions that Impact Effective Treatment				
4	Knowledge of cardiovascular/pulmonary system diseases/conditions and their pathophysiology to carry out the established plan of care	822	3.75	0.88
5	Knowledge of lymphatic system diseases/conditions and their pathophysiology to carry out the established plan of care	819	3.33	0.97
6	Knowledge of non-pharmacological medical management of the cardiovascular/pulmonary system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)	822	2.98	0.96
7	Knowledge of pharmacological management of the cardiovascular/pulmonary system	822	2.91	0.91
8	Knowledge of non-pharmacological medical management of the lymphatic system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)	821	2.75	0.93
9	Knowledge of pharmacological management of the lymphatic system	822	2.62	0.90
Interventions				
10	Knowledge of cardiovascular/pulmonary system PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence	822	3.89	0.91
11	Knowledge of anatomy and physiology of the cardiovascular/pulmonary system as related to PT interventions, daily activities, and environmental factors	822	3.96	0.87
12	Knowledge of secondary effects or complications from PT and medical interventions on cardiovascular/pulmonary system	822	3.97	0.88
13	Knowledge of secondary effects or complications on cardiovascular/pulmonary system from PT and medical interventions used on other systems	821	3.84	0.93
14	Knowledge of lymphatic system interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence	822	3.41	1.00
15	Knowledge of anatomy and physiology of the lymphatic system as related to interventions, daily activities, and environmental factors	822	3.39	1.01
16	Knowledge of secondary effects or complications from interventions on lymphatic system	821	3.32	0.99
17	Knowledge of secondary effects or complications on lymphatic system from interventions used on other systems	822	3.26	1.01
MUSCULOSKELETAL SYSTEM				
Physical Therapy Data Collection				
18	Knowledge of musculoskeletal system tests/measures, including outcome measures, and their applications according to current best evidence	822	4.22	0.88
19	Knowledge of anatomy and physiology of the musculoskeletal system as related to tests/measures	822	4.33	0.81
20	Knowledge of movement analysis as related to the musculoskeletal system	822	4.25	0.85
21	Knowledge of joint biomechanics and their applications	822	4.29	0.82
Diseases/Conditions that Impact Effective Treatment				

Table D1. (Continued)

PTA Knowledge Statement	Descriptive Statistics: Importance *n*	*M*	*SD*
22 Knowledge of muscular and skeletal system diseases/conditions and their pathophysiology to carry out the established plan of care	822	4.22	0.85
23 Knowledge of connective tissue diseases/conditions and their pathophysiology to carry out the established plan of care	822	4.02	0.88
24 Knowledge of non-pharmacological medical management of the musculoskeletal system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)	822	3.40	0.98
25 Knowledge of pharmacological management of the musculoskeletal system	822	3.21	0.97
Interventions			
26 Knowledge of musculoskeletal system PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence	822	4.34	0.82
27 Knowledge of anatomy and physiology of the musculoskeletal system as related to PT interventions, daily activities, and environmental factors	822	4.39	0.77
28 Knowledge of secondary effects or complications from PT and medical interventions on musculoskeletal system	822	4.18	0.84
29 Knowledge of secondary effects or complications on musculoskeletal system from PT and medical interventions used on other systems	821	4.08	0.89
NEUROMUSCULAR & NERVOUS SYSTEM			
Physical Therapy Data Collection			
30 Knowledge of neuromuscular/nervous system tests/measures, including outcome measures, and their applications according to current best evidence	820	3.83	0.98
31 Knowledge of anatomy and physiology of the neuromuscular/nervous system as related to tests/measures	822	3.90	0.96
32 Knowledge of movement analysis as related to the neuromuscular/nervous system	822	3.91	0.93
Diseases/Conditions that Impact Effective Treatment			
33 Knowledge of nervous system (CNS, PNS, ANS) diseases/conditions and their pathophysiology to carry out the established plan of care	822	3.88	0.92
34 Knowledge of non-pharmacological medical management of the neuromuscular/nervous system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)	822	3.18	1.02
35 Knowledge of pharmacological management of the neuromuscular/nervous system	822	3.05	0.99
Interventions			
36 Knowledge of neuromuscular/nervous system PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence	822	4.09	0.87
37 Knowledge of anatomy and physiology of the neuromuscular/nervous system as related to PT interventions, daily activities, and environmental factors	822	4.09	0.87
38 Knowledge of secondary effects or complications from PT and medical interventions on neuromuscular/nervous system	822	3.86	0.93
39 Knowledge of secondary effects or complications on neuromuscular/nervous system from PT and medical interventions used on other systems	820	3.78	0.96
40 Knowledge of motor control as related to neuromuscular/nervous system PT interventions	822	4.04	0.88
41 Knowledge of motor learning as related to the neuromuscular/nervous system PT interventions	822	4.00	0.92
INTEGUMENTARY SYSTEM			
Physical Therapy Data Collection			
42 Knowledge of integumentary system tests/measures, including outcome measures, and their applications according to current best evidence	822	3.23	0.99

Table D1. (Continued)

PTA Knowledge Statement	Descriptive Statistics: Importance *n*	*M*	*SD*
43 Knowledge of anatomy and physiology of the integumentary system as related to tests/measures	822	3.27	0.97
44 Knowledge of movement analysis as related to the integumentary system (e.g., friction, shear, pressure, and scar mobility)	821	3.53	0.97
Diseases/Conditions that Impact Effective Treatment			
45 Knowledge of integumentary system diseases/conditions and their pathophysiology to carry out the established plan of care	821	3.37	0.99
46 Knowledge of non-pharmacological medical management of the integumentary system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)	821	2.84	0.95
47 Knowledge of pharmacological management of the integumentary system	820	2.72	0.95
Interventions			
48 Knowledge of integumentary system PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence	822	3.48	1.01
49 Knowledge of anatomy and physiology of the integumentary system as related to PT interventions, daily activities, and environmental factors	822	3.52	0.98
50 Knowledge of secondary effects or complications from PT and medical interventions on integumentary system	822	3.40	0.99
51 Knowledge of secondary effects or complications on integumentary system from PT and medical interventions used on other systems	822	3.30	1.00
METABOLIC & ENDOCRINE SYSTEMS			
Diseases/Conditions that Impact Effective Treatment			
52 Knowledge of metabolic and endocrine system diseases/conditions and their pathophysiology to carry out the established plan of care	821	3.12	1.01
53 Knowledge of non-pharmacological medical management of the metabolic and endocrine systems (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)	822	2.73	0.97
54 Knowledge of pharmacological management of the metabolic and endocrine systems	822	2.66	0.98
Interventions			
55 Knowledge of metabolic and endocrine systems PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence	821	3.24	1.03
56 Knowledge of anatomy and physiology of the metabolic and endocrine systems as related to PT interventions, daily activities, and environmental factors	820	3.25	1.04
57 Knowledge of secondary effects or complications from PT and medical interventions on metabolic and endocrine systems	822	3.13	1.03
58 Knowledge of secondary effects or complications on metabolic and endocrine systems from PT and medical interventions used on other systems	819	3.08	1.04
GASTROINTESTINAL SYSTEM			
Diseases/Conditions that Impact Effective Treatment			
59 Knowledge of gastrointestinal system diseases/conditions and their pathophysiology to carry out the established plan of care	822	2.90	0.98
60 Knowledge of non-pharmacological medical management of the gastrointestinal system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)	822	2.55	0.91
61 Knowledge of pharmacological management of the gastrointestinal system	822	2.45	0.92

Table D1. (Continued)

	PTA Knowledge Statement	Descriptive Statistics: Importance *n*	*M*	*SD*
Interventions				
62	Knowledge of gastrointestinal system PT interventions and their applications for rehabilitation and health promotion according to current best evidence (e.g., positioning for reflux prevention, bowel programs)	822	3.00	1.09
63	Knowledge of anatomy and physiology of the gastrointestinal system as related to PT interventions, daily activities, and environmental factors	822	3.01	1.07
64	Knowledge of secondary effects or complications from PT and medical interventions on gastrointestinal system	822	2.89	1.06
65	Knowledge of secondary effects or complications on gastrointestinal system from PT and medical interventions used on other systems	822	2.85	1.06
GENITOURINARY SYSTEM				
Diseases/Conditions that Impact Effective Treatment				
66	Knowledge of genitourinary system diseases/conditions and their pathophysiology to carry out the established plan of care	822	2.77	1.02
67	Knowledge of non-pharmacological medical management of the genitourinary system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)	822	2.44	0.94
68	Knowledge of pharmacological management of the genitourinary system	822	2.37	0.93
Interventions				
69	Knowledge of genitourinary system PT interventions and their applications for rehabilitation and health promotion according to current best evidence (e.g., bladder programs, biofeedback, pelvic floor retraining)	821	2.92	1.07
70	Knowledge of anatomy and physiology of the genitourinary system as related to PT interventions, daily activities, and environmental factors	821	2.91	1.04
71	Knowledge of secondary effects or complications from PT and medical interventions on genitourinary system	822	2.78	1.06
72	Knowledge of secondary effects or complications on genitourinary system from PT and medical interventions used on other systems	821	2.70	1.06
SYSTEM INTERACTIONS				
Diseases/Conditions that Impact Effective Treatment				
73	Knowledge of diseases/conditions where the primary impact is on more than one system to carry out the established plan of care	822	3.74	0.90
74	Knowledge of the impact of co-morbidities/co-existing conditions on patient/client management (e.g., diabetes and hypertension; obesity and arthritis; hip fracture and dementia)	822	4.01	0.85
75	Knowledge of psychological and psychiatric conditions that impact patient/client management (e.g., depression, schizophrenia)	822	3.62	0.91
76	Knowledge of non-pharmacological medical management of multiple systems (e.g., diagnostic imaging and other medical tests, surgical procedures)	822	3.07	0.99
77	Knowledge of pharmacological management of multiple systems, including polypharmacy	820	2.89	1.02
EQUIPMENT & DEVICES				
	Knowledge of applications and adjustments, indications, contraindications, and precautions of:			
78	Assistive and adaptive devices	822	4.54	0.72
79	Prosthetic devices	821	3.90	0.97
80	Protective, supportive, and orthotic devices	821	4.08	0.91

Table D1. (Continued)

	PTA Knowledge Statement	Descriptive Statistics: Importance *n*	*M*	*SD*
THERAPEUTIC MODALITIES				
	Knowledge of applications, indications, contraindications, and precautions of:			
81	Thermal modalities	822	4.38	0.83
82	Iontophoresis	822	3.66	1.15
83	Electrotherapy modalities, excluding iontophoresis	822	4.12	0.97
84	Light modalities (e.g., laser, infrared, ultraviolet)	821	3.25	1.26
85	Phonophoresis	822	3.49	1.22
86	Ultrasound modalities, excluding phonophoresis	822	4.25	0.89
87	Mechanical modalities (e.g., mechanical motion devices, traction devices)	822	3.99	1.01
88	Hydrotherapy (e.g., pulsed lavage, whirlpool)	821	3.51	1.16
89	Biofeedback	822	3.27	1.14
90	Electromagnetic radiation (e.g., diathermy)	822	3.07	1.30
91	Pressure differential modalities (e.g., hyperbaric, negative pressure wound therapy, compression therapies)	820	3.02	1.20
SAFETY & PROTECTION				
92	Knowledge of factors influencing safety and injury prevention	822	4.62	0.67
93	Knowledge of the function and implications and related precautions of intravenous lines, tubes, catheters, and monitoring devices	809	4.05	0.97
94	Knowledge of emergency preparedness (e.g., CPR, first aid, disaster response)	822	4.43	0.79
95	Knowledge of infection control procedures (e.g., standard/universal precautions, isolation techniques, sterile technique)	822	4.61	0.67
96	Knowledge of signs/symptoms of physical, sexual, and psychological abuse and neglect	822	4.05	0.94
PROFESSIONAL RESPONSIBILITIES				
97	Knowledge of standards of documentation	822	4.54	0.70
98	Knowledge of professional ethical standards	822	4.64	0.64
99	Knowledge of standards of billing, coding, and reimbursement	821	3.75	1.06
100	Knowledge of patient/client rights (e.g., ADA, IDEA, HIPAA)	820	4.40	0.81
101	Knowledge of obligations for reporting illegal, unethical, or unprofessional behaviors (e.g., fraud, abuse, neglect)	822	4.34	0.84
102	Knowledge of state and federal laws, rules, regulations, and industry standards set by state and accrediting bodies (e.g., state licensing entities, Joint Commission, CARF, CMS)	822	4.20	0.92
103	Knowledge of risk guidelines (e.g., policies and procedures, incident reports)	822	3.96	0.97
104	Knowledge of human resource legal issues (e.g., OSHA, sexual harassment)	820	3.78	1.02
105	Knowledge of roles and responsibilities of PTA in relation to PT and other healthcare professionals	821	4.61	0.66
106	Knowledge of roles and responsibilities of other healthcare professionals and support staff	822	4.01	0.89
107	Knowledge of socio-cultural issues that impact patient/client management (e.g., language differences, ethnicity, customs, demographics, religion)	822	3.79	0.99
108	Knowledge of socioeconomic factors that impact patient/client management (e.g., social status, economic status, support system)	822	3.66	1.01
109	Knowledge of health information technology (e.g., electronic medical records, telemedicine)	821	3.54	1.07
TEACHING & LEARNING THEORIES				
110	Knowledge of teaching and learning theories and techniques	821	3.36	1.05

Table D1. (Continued)

PTA Knowledge Statement	Descriptive Statistics: Importance *n*	*M*	*SD*
111 Knowledge of health behavior change models (e.g., social cognitive theory, health belief model)	822	3.07	1.06
112 Knowledge of communication strategies	822	3.89	0.95
RESEARCH & EVIDENCE-BASED PRACTICE			
113 Knowledge of literature access techniques	821	3.05	0.97
114 Knowledge of basic research concepts	822	2.94	0.99
115 Knowledge of data collection techniques (e.g., surveys, direct observation)	822	2.81	0.99
SKILLS			
116 Active listening - Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times	822	4.60	0.66
117 Speaking - Talking to others to convey information effectively	821	4.56	0.65
118 Reading Comprehension - Understanding written sentences and paragraphs in work related documents	822	4.37	0.78
119 Critical Thinking - Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems	821	4.43	0.75
120 Social Perceptiveness - Being aware of others' reactions and understanding why they react as they do	822	4.28	0.81
121 Time Management - Managing one's own time and the time of others	822	4.42	0.77
122 Coordination - Adjusting actions in relation to others' actions	821	4.24	0.84
123 Writing – Communicating effectively in writing as appropriate for the needs of the audience	822	4.31	0.79
124 Active Learning- Understanding the implications of new information for both current and future problem solving and decision-making	822	4.25	0.83
125 Persuasion – Persuading others to change their minds or behavior	822	3.62	1.07
126 Negotiation – Bringing others together and trying to reconcile difference	822	3.73	1.05
127 Service Orientation — Actively looking for ways to help people	820	4.10	0.92

Note: Importance response scale ranged from 1 (Unimportant) to 5 (Extremely Important). Responses of 0 (Knowledge is not needed) have been removed from the analysis.

Appendix E

Blueprint Exercise

Weighting of Knowledge Categories

We want you to evaluate the relative importance of each knowledge category for safe and effective performance as an entry-level PTA. In making this judgment, you should distribute 100 points across each of the areas listed within each table.

An example is provided on the following page. In this example, the Musculoskeletal System and the Neuromuscular and Nervous Systems are judged as the most important areas and have each been given a weight of 20, indicating that (in this person's opinion), each of these systems should receive 20% of the weight on the NPTE for entry-level PTAs. The Cardiovascular/Pulmonary & Lymphatic Systems is the next most important area (15%), followed by System Interactions (8%). The Integumentary System, Gastrointestinal System, Equipment & Devices, Therapeutic Modalities, and Safety & Protection are all deemed to be slightly less important than the aforementioned systems, and each is assigned a weight of 5%. Metabolic and Endocrine System, Genitourinary System, Professional Responsibilities, and Research & Evidence-Based Practice (3% each), are assigned less weight by this person, indicating that they are less important for an entry-level PTA than the other topic areas, but they are of approximately equal importance.

The sum of the weights within each category should always add to 100. The individual values you assign do *not* need to be divisible by 5 or 10.

Please make your judgments in the column labeled 'Initial Ratings' in the table on the left hand side of page 3. After everyone makes their initial ratings, we will discuss the initial ratings and ask you to complete the 'final ratings' in the table on the right hand side of page 3.

Before you begin:

- Please review the KSR survey results once more and familiarize yourself with the knowledge reflected by each category and the importance of those knowledge areas according to the survey respondents. Note that some categories might have a small number of very important knowledge and skill requirements, while other categories might have a greater number of moderately important knowledge and skill requirements. A category with a lot of statements is not necessarily more important than a category with fewer statements.
- As you make your ratings, please attend to the results of the work activities survey as well. In order to distinguish between the relative importance of one system versus another, or between Therapeutic Modalities and Equipment and Devices, for example, you might find it helpful to look at the work activities survey results and consider the frequency and importance of the various work activities.
- Consider the results of the demographic/background information questions. Keep in mind the experience, work settings, practice areas, and other information reported by the entry-level PTAs (on the work activities survey) and the experienced PTs and PTAs (on the KSR survey).
- While we want you to attend to and account for the survey results when making your judgments, consider your experience and your knowledge of the field as well.

Keep in mind that you are indicating the relative importance of each knowledge category for safe and effective performance as an entry-level PTA.

Example

Table 1: Overall Categories	
Weights	
15	**CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS**
20	**MUSCULOSKELETAL SYSTEM**
20	**NEUROMUSCULAR & NERVOUS SYSTEMS**
5	**INTEGUMENTARY SYSTEM**
3	**METABOLIC & ENDOCRINE SYSTEMS**
5	**GASTROINTESTINAL SYSTEM**
3	**GENITOURINARY SYSTEM**
8	**SYSTEM INTERACTIONS**
5	**EQUIPMENT & DEVICES**
5	**THERAPEUTIC MODALITIES**
5	**SAFETY & PROTECTION**
3	**PROFESSIONAL RESPONSIBILITIES**
3	**RESEARCH & EVIDENCE-BASED PRACTICE**
100	Numbers assigned should add to 100

Name: _____

Table 1: Overall Categories
Initial Ratings
CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS
MUSCULOSKELETAL SYSTEM
NEUROMUSCULAR & NERVOUS SYSTEMS
INTEGUMENTARY SYSTEM
METABOLIC & ENDOCRINE SYSTEMS
GASTROINTESTINAL SYSTEM
GENITOURINARY SYSTEM
SYSTEM INTERACTIONS
EQUIPMENT & DEVICES
THERAPEUTIC MODALITIES
SAFETY & PROTECTION
PROFESSIONAL RESPONSIBILITIES
RESEARCH & EVIDENCE-BASED PRACTICE
Numbers assigned should add to 100

Table 1: Overall Categories
Final Ratings
CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS
MUSCULOSKELETAL SYSTEM
NEUROMUSCULAR & NERVOUS SYSTEMS
INTEGUMENTARY SYSTEM
METABOLIC & ENDOCRINE SYSTEMS
GASTROINTESTINAL SYSTEM
GENITOURINARY SYSTEM
SYSTEM INTERACTIONS
EQUIPMENT & DEVICES
THERAPEUTIC MODALITIES
SAFETY & PROTECTION
PROFESSIONAL RESPONSIBILITIES
RESEARCH & EVIDENCE-BASED PRACTICE
Numbers assigned should add to 100

Assigning Weights to System Sub-categories

In this section, we want you to evaluate the relative importance of each system knowledge sub-category for safe and effective performance as an entry-level PTA. In making this judgment, you should distribute 100 points across each of the areas listed within each table. The individual values you assign do *not* need to be divisible by 5 or 10.

In this case, you are assigning the relative importance of the different sub-categories within a system. Starting with the Cardiovascular/Pulmonary and Lymphatic Systems, if you believe the knowledge related to *Interventions* is more important than the knowledge related to *Data Collection* or *Diseases/Conditions that Impact Effective Treatment*, you might assign 40%, 50%, or more of the weight within Cardiovascular/Pulmonary and Lymphatic Systems to *Interventions*, and divide the remaining points between *Data Collection* and *Diseases/Conditions that Impact Effective Treatment*.

As with the category level ratings:

- Please review the KSR survey results and familiarize yourself with the knowledge reflected by each sub-category and the importance of those knowledge areas according to the survey respondents.
- As you make your ratings, please attend to the results of the work activities survey as well. In order to distinguish between the relative importance of data collection and interventions, for example, you might find it helpful to look at the work activities survey results and consider the frequency and importance of the various work activities.
- Consider the results of the demographic/background information questions. Keep in mind the experience, work settings, practice areas, and other information reported by the entry-level PTAs (on the work activities survey) and the experienced PTs and PTAs (on the KSR survey).
- While we want you to attend to and account for the survey results when making your judgments, consider your experience and your knowledge of the field as well.
- Some systems have three sub-categories (Data Collection, Diseases/Conditions that Impact Effective Treatment, and Interventions) while other systems have only two sub-categories.

Again, keep in mind that you are indicating the relative importance of each knowledge category for safe and effective performance as an entry-level PTA.

Table 2: CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS		
Initial Ratings		*Final Ratings*
	CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS: Physical Therapy Data Collection	
	CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS: Diseases/Conditions that Impact Effective Treatment	
	CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS: Interventions	
	Numbers assigned should add to 100	

Table 3: MUSCULOSKELETAL SYSTEM		
Initial Ratings		*Final Ratings*
	MUSCULOSKELETAL SYSTEM: Physical Therapy Data Collection	
	MUSCULOSKELETAL SYSTEM: Diseases/Conditions that Impact Effective Treatment	
	MUSCULOSKELETAL SYSTEM: Interventions	
	Numbers assigned should add to 100	

Table 4: NEUROMUSCULAR & NERVOUS SYSTEMS		
Initial Ratings		*Final Ratings*
	NEUROMUSCULAR & NERVOUS SYSTEMS: Physical Therapy Data Collection	
	NEUROMUSCULAR & NERVOUS SYSTEMS: Diseases/Conditions that Impact Effective Treatment	
	NEUROMUSCULAR & NERVOUS SYSTEMS: Interventions	
	Numbers assigned should add to 100	

Table 5: INTEGUMENTARY SYSTEM		
Initial Ratings		*Final Ratings*
	INTEGUMENTARY SYSTEM: Physical Therapy Data Collection	
	INTEGUMENTARY SYSTEM: Diseases/Conditions that Impact Effective Treatment	
	INTEGUMENTARY SYSTEM: Interventions	
	Numbers assigned should add to 100	

Table 6: METABOLIC & ENDOCRINE SYSTEMS		
Initial Ratings		*Final Ratings*
	METABOLIC & ENDOCRINE SYSTEMS: Diseases/Conditions that Impact Effective Treatment	
	METABOLIC & ENDOCRINE SYSTEMS: Interventions	
	Numbers assigned should add to 100	

Table 7: GASTROINTESTINAL SYSTEM		
Initial Ratings		*Final Ratings*
	GASTROINTESTINAL SYSTEM: Diseases/Conditions that Impact Effective Treatment	
	GASTROINTESTINAL SYSTEM: Interventions	
	Numbers assigned should add to 100	

Table 8: GENITOURINARY SYSTEM		
Initial Ratings		*Final Ratings*
	GENITOURINARY SYSTEM: Diseases/Conditions that Impact Effective Treatment	
	GENITOURINARY SYSTEM: Interventions	
	Numbers assigned should add to 100	

Appendix F

Final List of Critical Work Activities

PATIENT/CLIENT ASSESSMENT

Information Gathering & Synthesis

Interview patients/clients, caregivers, and family to obtain patient/client history and current information (e.g., medical, surgical, medications, social, cultural, economic) to...

...review prior and current level of function

...establish general health status (e.g., fatigue, fever, malaise, unexplained weight change)

Review medical records (e.g., lab values, diagnostic tests, specialty reports, narrative, consults, physical therapy documentation) prior to carrying out the PT plan of care

Gather information/discuss client/patient's current health status with interprofessional/interdisciplinary team members (e.g., teacher, physician, rehabilitation member)

Identify signs/symptoms of change in patient/client's health status that require intervention by physical therapist

Identify signs/symptoms of change in patient/client's health status that require intervention by interprofessional/interdisciplinary team members

Systems Review

Check patient's/client's current affect, cognition, communication, and learning style (e.g., ability to make needs known, consciousness, orientation, expected emotional/behavioral responses, learning preferences)

Recognize changes in status of the...

...patient/client's quality of speech, hearing, vision (e.g., dysarthria, pitch/tone, use corrective lenses, use of hearing aids)

...vestibular system (e.g., dizziness, vertigo)

...gastrointestinal system (e.g., difficulty swallowing, heartburn, indigestion, change in appetite/diet)

...genitourinary system (e.g., frequency, volume, urgency, incontinent episodes)

...genital reproductive system (e.g., sexual and/or menstrual dysfunction)

...cardiovascular/pulmonary system (e.g., blood pressure, heart rate)

...integumentary system (e.g., presence of scar formation, skin integrity, edema)

...musculoskeletal system (e.g., gross symmetry, strength, weight, height, range of motion)

...neuromuscular system (e.g., gross coordinated movements, motor function, locomotion)

Data Collection

Cardiovascular and Pulmonary

Perform tests and measures of...

...cardiovascular function (e.g., blood pressure, heart rate, heart sounds)

...pulmonary function (e.g., respiratory rate, oxygen saturation, breathing patterns, breath sounds, chest excursion)

...perfusion and gas exchange (e.g., airway protection, pulse oximetry)

...peripheral circulation (e.g., peripheral pulses, capillary refill, blood pressure in upper versus lower extremities)

...critical limb ischemia (e.g., skin perfusion pressure, pulse volume recordings)

...physiological responses to position change (e.g., orthostatic hypotension, skin color, blood pressure, heart rate)

...aerobic capacity under maximal and submaximal conditions (e.g., gait speed, treadmill testing, cadence, numbers of stairs climbed, metabolic equivalents)

Anthropomorphic

Perform tests and measures of...

...body composition (e.g., percent body fat, lean muscle mass, BMI, hip-to-waist ratio)

...body dimensions (e.g., height, weight, girth, limb length, head circumference/shape)

Quantify edema (e.g., palpation, volume test, circumference)

Arousal, Attention, & Cognition

Perform tests and measures of...

...attention and cognition (e.g., ability to process commands)

...patient's/client's ability to communicate (e.g., expressive and receptive skills, following instructions)

...arousal and orientation to time, person, place, and situation

...recall (including memory and retention)

Nerve Integrity

Perform tests and measures of...

...neural provocation (e.g., tapping, tension/stretch)

...cranial nerve integrity (e.g., facial asymmetry, oculomotor function, hearing)

...peripheral nerve integrity (e.g. sensation, strength)

...spinal nerve integrity (e.g., dermatome, myotome)

Environmental & Community Integration/Reintegration (Home, Work, Job, School, Play, & Leisure)

Collect data on client/patient's ability to perform activities of daily living (ADL) (e.g., bed mobility, transfers, household mobility, dressing, self-care)

Collect data on ability to perform instrumental activities of daily living (IADL) (e.g., household chores, hobbies, money management)

Collect data on ability to perform skills needed for integration or reintegration into the community, work, or school

Collect data on barriers (e.g., social, economic, physical, environmental, work conditions and activities) to community, work, or school integration/reintegration

Collect data on ability to participate in activities with or without the use of devices or equipment

Ergonomics and Body Mechanics

Perform tests and measures of...

...ergonomics and body mechanics during self-care, home, management, work, community, or leisure actions, tasks, or activities (e.g., how patient moves, whether patient aggravates the injury)

...postural alignment and position (static and dynamic)

Functional Mobility, Balance, & Vestibular

Perform tests and measures of...

...balance (dynamic and static) with or without the use of specialized equipment

...gait and locomotion (e.g. ambulation, wheelchair mobility) with or without the use of specialized equipment

...mobility during functional activities and transitional movements (e.g., transfers, bed mobility)

...vestibular function (e.g., peripheral dysfunction, central dysfunction)

Integumentary Integrity

Collect data on patient/client's activities, positioning, and postures that produce or relieve trauma to the skin

Identify devices and equipment that produce or relieve trauma to the patient/client's skin

Observe skin characteristics (e.g., blistering, continuity of skin color, dermatitis, hair growth, mobility, nail growth, sensation, temperature, texture, turgor)

Collect data on wound characteristics (e.g., tissue involvement, depth, tunneling, burn degree)

Observe scar tissue characteristics (e.g., banding, pliability, sensation, and texture)

Joint Integrity & Range of Motion

Perform tests and measures of...

...peripheral joint stability (e.g., ligamentous integrity, joint structure)

...spinal joint stability (e.g., ligamentous integrity, joint structure)

...peripheral joint mobility (e.g., glide, end feel)

...spinal joint mobility (e.g., glide, end feel)

...range of motion (e.g., functional and physiological)

...active and passive joint range of motion (e.g., goniometry)

...flexibility (e.g., muscle length, soft tissue extensibility)

Muscle Performance & Motor Function

Perform tests and measures of...

...muscle tone (e.g., hypertonicity, hypotonicity, dystonia)

… muscle strength, power, and endurance (e.g., manual muscle test, isokinetic testing, dynamic testing)

...dexterity, coordination, and agility (e.g., rapid alternating movement, finger to nose)

...ability to initiate, modify and control movement patterns and postures (e.g., catching a ball, gait)

...ability to change movement performance with practice (e.g., motor learning)

...patient's need for assistance (e.g. during transfers, in the application of devices)

Neuromotor Development & Sensory Integration

Perform tests and measures of...

...acquisition and evolution of motor skills

...sensorimotor integration

...developmental reflexes and reactions (e.g., asymmetrical tonic neck reflex, righting reactions)

Reflex Integrity

Perform tests and measures of...

...deep tendon/muscle stretch reflexes (e.g., quadriceps, biceps)

...superficial reflexes and reactions (e.g., cremasteric reflex, abdominal reflexes)

...upper motor neuron integrity (e.g., Babinski reflex, Hoffman sign)

Pain & Sensory Integrity

Perform tests and measures of...

...pain (e.g., location, intensity, characteristics, frequency)

...deep sensation (e.g., proprioception, kinesthesia, pressure)

...superficial sensation (e.g., touch, temperature discrimination)

INTERVENTIONS

Modify and/or progress treatment within the plan of care

Procedural Interventions

Therapeutic Exercise/Therapeutic Activities

Train in aerobic capacity/endurance conditioning

Train in strength, power and endurance exercises

Train in balance, coordination, and agility activities

Train in body mechanics and postural stabilization techniques

Perform flexibility techniques

Train in flexibility techniques

Train in neuromotor techniques (e.g., movement pattern training, neuromuscular education or reeducation)

Perform desensitization techniques (e.g., brushing, tapping, use of textures)

Train desensitization techniques (e.g., brushing, tapping, use of textures)

Perform mechanical positioning for vestibular dysfunction

Train in habituation/adaptation exercises for vestibular dysfunction (e.g., vestibuloccular reflex, position changes)

Train in relaxation techniques

Train in genitourinary management (e.g., pelvic floor exercises, bladder strategies)

Train in gastrointestinal management (e.g., bowel strategies, positioning to avoid reflux)

Pulmonary Interventions

Administer prescribed oxygen during interventions

Perform manual/mechanical airway clearance techniques (e.g., assistive cough, percussion, vibration, shaking)

Train in manual/mechanical airway clearance techniques (e.g., assistive devices, assistive cough, incentive spirometer, flutter valve, percussion/postural drainage

Perform techniques to maximize ventilation and perfusion (e.g., assistive cough, positioning)

Train in breathing strategies (e.g., active cycle breathing, autogenic drainage, paced breathing, pursed lip breathing) and techniques to maximize ventilation and perfusion (e.g., assistive cough, positioning, pursed-lip breathing)

Functional Training

Train in the use of barrier accommodations or modifications (e.g. ramps, grab bars, raised toilet, environmental control units)

Train in Activities of Daily Living (ADL) (e.g., bed mobility, transfers, household mobility, dressing, self-care)

Train in community and leisure integration or reintegration (e.g., work/school/play)

Train in Instrumental Activities of Daily Living (IADL) (e.g., household chores, hobbies, money management)

Train in mobility techniques (e.g., crawling, walking, running)

Train in fall prevention and fall recovery strategies

Train in behavior modification and cognitive strategies

Manual Therapy Techniques

Perform spinal manual traction

Perform peripheral manual traction

Perform soft tissue mobilization (e.g., connective tissue massage, therapeutic massage)

Perform peripheral joint range of motion

Perform peripheral mobilization/manipulation (non-thrust)

Perform spinal mobilization/manipulation (non-thrust)

Devices & Equipment

Apply and/or adjust...

- ...adaptive devices (e.g., utensils, seating and positioning devices, steering wheel devices)
- ...protective devices (e.g., braces, cushions, helmets, protective taping)
- ...supportive devices (e.g., compression garments, corsets, elastic wraps, neck collars, serial casts)
- ...orthotic devices (e.g., braces, casts, shoe inserts, splints)
- ...assistive devices (e.g., canes, crutches, walkers, wheelchairs, tilt tables, standing frames)
- ...prosthetic devices (e.g., lower extremity and upper-extremity)
- ...mechanical neuromuscular reeducation devices (e.g., weighted vests, therapeutic suits, body weight supported treadmill, proprioceptive taping)

Train in use of...

- ...adaptive devices (e.g., utensils, seating and positioning devices, steering wheel devices)
- ...assistive devices (e.g., canes, crutches, walkers, wheelchairs, tilt tables, standing frames)
- ...orthotic devices (e.g., braces, casts, shoe inserts, splints)
- ...prosthetic devices (e.g., lower extremity and upper-extremity)
- ...protective devices (e.g., braces, cushions, helmets, protective taping)
- ...supportive devices (e.g., compression garments, corsets, elastic wraps, neck collars, serial casts)
- ...mechanical neuromuscular re-education devices (e.g., weighted vests, therapeutic suits, body weight supported treadmill, proprioceptive taping)

Integumentary Repair

Apply topical agents (e.g., cleansers, creams, moisturizers, ointments, sealants) and dressings (e.g., hydrogels, negative pressure wound therapy, wound coverings)

Therapeutic Modalities

Perform biofeedback therapy (e.g., relaxation techniques, muscle reeducation, EMG)

Perform iontophoresis

Perform phonophoresis

Perform electrical stimulation therapy (e.g., electrical muscle stimulation (EMS), TENS, functional electrical stimulation (FES))

Perform cryotherapy procedures (e.g., cold pack, ice massage, vapocoolant spray)

Train in cryotherapy procedures

Perform hydrotherapy procedures using contrast baths/pools

Train in hydrotherapy procedures using contrast baths/pools

Perform ultrasound procedures

Perform diathermy procedures

Perform hot pack thermotherapy procedures

Train in hot pack thermotherapy procedures

Perform paraffin bath thermotherapy procedures

Train in paraffin bath thermotherapy procedures

Mechanical Modalities

Apply intermittent pneumatic compression

Apply continuous passive motion (CPM) devices

Train in continuous passive motion (CPM) devices

Apply mechanical spinal traction

Train in mechanical spinal traction

Non-procedural Interventions

Communication

Discuss physical therapy evaluation findings, interventions, goals, prognosis, discharge planning, and plan of care with supervising physical therapist

Discuss physical therapy evaluation findings, interventions, goals, prognosis, discharge planning, and plan of care with interprofessional/interdisciplinary team members (e.g., teacher, physician, rehabilitation member)

Discuss physical therapy evaluation findings, interventions, goals, prognosis, discharge planning, and plan of care with patient/client and caregiver

Provide written and oral information to the patient/client and/or caregiver

Documentation

Document data collection results

Document intervention(s) and patient/client response(s) to intervention

Document patient/client and caregiver education

Document communication related to the patient's/client's care (e.g., supervising physical therapist, doctor, teacher, case manager)

Provides information for billing and reimbursement

Document disclosure and consent (e.g., disclosure of medical information, consent for treatment)

Education

Educate patient/client about current condition and health status (e.g., treatment outcomes, plan of care, risk and benefit factors)

Educate caregivers about patient's/client's current condition and health status (e.g., treatment outcomes, plan of care, risk and benefit factors)

Educate healthcare team about role of PTA in patient/client management

Educate patient/client and caregiver on lifestyle and behavioral changes to promote wellness (e.g., nutrition interventions, physical activity, tobacco cessation)

Educate community groups on lifestyle and behavioral changes to promote wellness (e.g., nutrition interventions, physical activity, tobacco cessation)

Patient/Client and Staff Safety

Emergency Procedures

Implement emergency life support procedures

Perform first aid

Implement disaster response procedures

Environmental Safety

Perform risk assessment of the physical environment (e.g., barrier-free environment, outlets, windows, floors, lighting)

Prepare and maintain a safe working environment for performing interventions (e.g., unobstructed walkways, equipment availability)

Perform regular equipment inspections (e.g., modalities, assistive devices)

Infection Control

Perform activities using appropriate infection control practices (e.g., universal precautions, hand hygiene, isolation, airborne precautions)

Create and maintain an aseptic environment for patient/client interaction

Research & Evidence-Based Practice

Search the literature for current best evidence

Evaluate the quality of published data

Integrate current best evidence, clinical experience, and patient values in clinical practice (e.g., clinical prediction rules, patient preference)

Participate in research activities

Compare intervention outcomes with published data

Professional Responsibilities

Assign tasks to other personnel (e.g., physical therapy aides) to assist with patient/client care

Disclose financial interest in recommended products or services to patient/client

Communicate with the physical therapist when the expectations of the PTA are beyond their knowledge, skills, and abilities

Report health care providers that are suspected to not perform their professional responsibilities with reasonable skill and safety to the appropriate authorities[!]

Report suspected cases of abuse involving children or vulnerable adults to the appropriate authority

Report suspected illegal or unethical acts performed by health care professionals to the relevant authority

Advocate for public access to physical therapy and other healthcare services

Read and evaluate the quality of professional journals, magazines, and publications to maintain currency of knowledge

Determine own need for professional development (i.e., continued competence)

Participate in learning and/or development activities to maintain the currency of knowledge, skills, and abilities

Practice within the jurisdiction regulations and professional standards.

Participate in professional organizations

Appendix G

Final List of Critical Knowledge to be Included on the NPTE

CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS
Physical Therapy Data Collection
Knowledge of cardiovascular/pulmonary system tests/measures, including outcome measures, and their applications according to current best evidence
Knowledge of anatomy and physiology of the cardiovascular/pulmonary system as related to tests/measures
Knowledge of movement analysis as related to the cardiovascular/pulmonary system (e.g., rib cage excursion)
Diseases/Conditions that Impact Effective Treatment
Knowledge of cardiovascular/pulmonary system diseases/conditions and their pathophysiology to carry out the established plan of care
Knowledge of lymphatic system diseases/conditions and their pathophysiology to carry out the established plan of care
Knowledge of non-pharmacological medical management of the cardiovascular/pulmonary system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)
Knowledge of pharmacological management of the cardiovascular/pulmonary system
Knowledge of non-pharmacological medical management of the lymphatic system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)
Interventions
Knowledge of cardiovascular/pulmonary system PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence
Knowledge of anatomy and physiology of the cardiovascular/pulmonary system as related to PT interventions, daily activities, and environmental factors
Knowledge of secondary effects or complications from PT and medical interventions on cardiovascular/pulmonary system
Knowledge of secondary effects or complications on cardiovascular/pulmonary system from PT and medical interventions used on other systems
Knowledge of lymphatic system interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence
Knowledge of anatomy and physiology of the lymphatic system as related to interventions, daily activities, and environmental factors
Knowledge of secondary effects or complications from interventions on lymphatic system
Knowledge of secondary effects or complications on lymphatic system from interventions used on other systems
MUSCULOSKELETAL SYSTEM
Physical Therapy Data Collection
Knowledge of musculoskeletal system tests/measures, including outcome measures, and their applications according to current best evidence
Knowledge of anatomy and physiology of the musculoskeletal system as related to tests/measures
Knowledge of movement analysis as related to the musculoskeletal system
Knowledge of joint biomechanics and their applications
Diseases/Conditions that Impact Effective Treatment
Knowledge of muscular and skeletal system diseases/conditions and their pathophysiology to carry out the established plan of care
Knowledge of connective tissue diseases/conditions and their pathophysiology to carry out the established plan of care
Knowledge of non-pharmacological medical management of the musculoskeletal system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)
Knowledge of pharmacological management of the musculoskeletal system
Interventions
Knowledge of musculoskeletal system PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence

Knowledge of anatomy and physiology of the musculoskeletal system as related to PT interventions, daily activities, and environmental factors

Knowledge of secondary effects or complications from PT and medical interventions on musculoskeletal system

Knowledge of secondary effects or complications on musculoskeletal system from PT and medical interventions used on other systems

NEUROMUSCULAR & NERVOUS SYSTEM

Physical Therapy Data Collection

Knowledge of neuromuscular/nervous system tests/measures, including outcome measures, and their applications according to current best evidence

Knowledge of anatomy and physiology of the neuromuscular/nervous system as related to tests/measures

Knowledge of movement analysis as related to the neuromuscular/nervous system

Diseases/Conditions that Impact Effective Treatment

Knowledge of nervous system (CNS, PNS, ANS) diseases/conditions and their pathophysiology to carry out the established plan of care

Knowledge of non-pharmacological medical management of the neuromuscular/nervous system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)

Knowledge of pharmacological management of the neuromuscular/nervous system

Interventions

Knowledge of neuromuscular/nervous system PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence

Knowledge of anatomy and physiology of the neuromuscular/nervous system as related to PT interventions, daily activities, and environmental factors

Knowledge of secondary effects or complications from PT and medical interventions on neuromuscular/nervous system

Knowledge of secondary effects or complications on neuromuscular/nervous system from PT and medical interventions used on other systems

Knowledge of motor control as related to neuromuscular/nervous system PT interventions

Knowledge of motor learning as related to the neuromuscular/nervous system PT interventions

INTEGUMENTARY SYSTEM

Physical Therapy Data Collection

Knowledge of integumentary system tests/measures, including outcome measures, and their applications according to current best evidence

Knowledge of anatomy and physiology of the integumentary system as related to tests/measures

Knowledge of movement analysis as related to the integumentary system (e.g., friction, shear, pressure, and scar mobility)

Diseases/Conditions that Impact Effective Treatment

Knowledge of integumentary system diseases/conditions and their pathophysiology to carry out the established plan of care

Knowledge of non-pharmacological medical management of the integumentary system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)

Knowledge of pharmacological management of the integumentary system

Interventions

Knowledge of integumentary system PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence

Knowledge of anatomy and physiology of the integumentary system as related to PT interventions, daily activities, and environmental factors

Knowledge of secondary effects or complications from PT and medical interventions on integumentary system

Knowledge of secondary effects or complications on integumentary system from PT and medical interventions used on other systems

METABOLIC & ENDOCRINE SYSTEMS

Diseases/Conditions that Impact Effective Treatment

Knowledge of metabolic and endocrine system diseases/conditions and their pathophysiology to carry out the established plan of care

Knowledge of non-pharmacological medical management of the metabolic and endocrine systems (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)

Knowledge of pharmacological management of the metabolic and endocrine systems

Interventions

Knowledge of metabolic and endocrine systems PT interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence

Knowledge of anatomy and physiology of the metabolic and endocrine systems as related to PT interventions, daily activities, and environmental factors

Knowledge of secondary effects or complications from PT and medical interventions on metabolic and endocrine systems

Knowledge of secondary effects or complications on metabolic and endocrine systems from PT and medical interventions used on other systems

GASTROINTESTINAL SYSTEM

Diseases/Conditions that Impact Effective Treatment

Knowledge of gastrointestinal system diseases/conditions and their pathophysiology to carry out the established plan of care

Knowledge of non-pharmacological medical management of the gastrointestinal system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)

Knowledge of pharmacological management of the gastrointestinal system

Interventions

Knowledge of gastrointestinal system PT interventions and their applications for rehabilitation and health promotion according to current best evidence (e.g., positioning for reflux prevention, bowel programs)

Knowledge of anatomy and physiology of the gastrointestinal system as related to PT interventions, daily activities, and environmental factors

Knowledge of secondary effects or complications from PT and medical interventions on gastrointestinal system

Knowledge of secondary effects or complications on gastrointestinal system from PT and medical interventions used on other systems

GENITOURINARY SYSTEM

Diseases/Conditions that Impact Effective Treatment

Knowledge of genitourinary system diseases/conditions and their pathophysiology to carry out the established plan of care

Knowledge of non-pharmacological medical management of the genitourinary system (e.g., diagnostic imaging, lab values, other medical tests, surgical procedures)

Knowledge of pharmacological management of the genitourinary system

Interventions

Knowledge of genitourinary system PT interventions and their applications for rehabilitation and health promotion according to current best evidence (e.g., bladder programs, biofeedback, pelvic floor retraining)

Knowledge of anatomy and physiology of the genitourinary system as related to PT interventions, daily activities, and environmental factors

Knowledge of secondary effects or complications from PT and medical interventions on genitourinary system

Knowledge of secondary effects or complications on genitourinary system from PT and medical interventions used on other systems

SYSTEM INTERACTIONS

Diseases/Conditions that Impact Effective Treatment

Knowledge of diseases/conditions where the primary impact is on more than one system to carry out the established plan of care
Knowledge of the impact of co-morbidities/co-existing conditions on patient/client management (e.g., diabetes and hypertension; obesity and arthritis; hip fracture and dementia)
Knowledge of psychological and psychiatric conditions that impact patient/client management (e.g., depression, schizophrenia)
Knowledge of non-pharmacological medical management of multiple systems (e.g., diagnostic imaging and other medical tests, surgical procedures)
Knowledge of pharmacological management of multiple systems, including polypharmacy
EQUIPMENT & DEVICES
Knowledge of applications and adjustments, indications, contraindications, and precautions of:
Assistive and adaptive devices
Prosthetic devices
Protective, supportive, and orthotic devices
THERAPEUTIC MODALITIES
Knowledge of applications, indications, contraindications, and precautions of:
Thermal modalities
Iontophoresis
Electrotherapy modalities, excluding iontophoresis
Phonophoresis
Ultrasound modalities, excluding phonophoresis
Mechanical modalities (e.g., mechanical motion devices, traction devices)
Biofeedback
Electromagnetic radiation (e.g., diathermy)
Pressure differential modalities
SAFETY & PROTECTION
Knowledge of factors influencing safety and injury prevention
Knowledge of the function and implications and related precautions of intravenous lines, tubes, catheters, and monitoring devices
Knowledge of emergency preparedness (e.g., CPR, first aid, disaster response)
Knowledge of infection control procedures (e.g., standard/universal precautions, isolation techniques, sterile technique)
Knowledge of signs/symptoms of physical, sexual, and psychological abuse and neglect
PROFESSIONAL RESPONSIBILITIES
Knowledge of standards of documentation
Knowledge of patient/client rights (e.g., ADA, IDEA, HIPAA)
Knowledge of human resource legal issues (e.g., OSHA, sexual harassment)
Knowledge of roles and responsibilities of PTA in relation to PT and other healthcare professionals
Knowledge of roles and responsibilities of other healthcare professionals and support staff
RESEARCH & EVIDENCE-BASED PRACTICE
Knowledge of basic research concepts
Knowledge of data collection techniques (e.g., surveys, direct observation)

Appendix H

Measurement Approaches Literature Review

Because some knowledge and skill requirements are not well suited for a multiple-choice knowledge testing format, we conducted extensive research on assessment methods that may be more appropriate for measuring these KSRs. The following summary is presented as a resource that FSBPT may use as it considers options for measuring KSRs that are important but are not covered by the NPTE. Alternate measurement methods examined include knowledge or ability tests, self- or other-report measures, selected response simulations, performance assessments, measures of past performance, training, education, and/or experience, and structured interviews. We include descriptions and evidence regarding these measurement methods, as well as examples of existing measures that use these methods to assess constructs similar to FSBPT's knowledge and skill requirements that have been identified as difficult-to-test.

The sample measures cited in each measurement method category are meant to provide examples of existing applications of testing methods rather than recommendations about specific tests to license. There is not one single best measurement method for any given KSR, and different assessment programs could measure the same knowledge and skill requirements in very different ways. Various factors need to be considered when evaluating assessments, such as validity, reliability, and affordability (see Knapp, Russell, & Bradley, 2011 for additional details about measurement methods). Thus, the information is provided as a summary of measurement methods that could potentially be used to measure knowledge and skill requirements that are not well aligned with the current format of the NPTE. If FSBPT considers supplementing the NPTE in the future, this information can provide a starting point and reference.

Knowledge or Ability Tests

Selected Response Items

Included in this measurement category are written or computer-based knowledge or ability tests with selected response (e.g., multiple-choice) items. Declarative knowledge requirements could be assessed by this method, as could the following skills and knowledge. We note that although some of these knowledge and skill requirements can be tested in a multiple-choice format, the NPTE is currently focused on the clinical application of knowledge and does not currently incorporate certain testing features (e.g., audio, video) that would be required.

Technology-related KSRs (e.g., Knowledge of literature access techniques, Knowledge of health information technology). An example measure is the Assessment of Basic Computer Proficiency (Bradlow, Hoch, & Hutchinson, 2002), in which test takers respond to multiple-choice, true/false, and check-all-that-apply items measuring knowledge in nine domains: terminology, file management, word processing, spreadsheets, databases, printing, email, Internet, and information search.

Active listening. Listening can be measured with a selected response format in which test takers listen to sentences, passages, or lectures and respond to multiple-choice items about what they have heard. Example measures include:

- Pearson Test of English, Academic (http://pearsonpte.com/PTEAcademic/Pages/home.aspx;

http://pearsonpte.com/PTEAcademic/Tutorial/Documents/PTEA_Tutorial.pdf). In the listening section of this test (which also includes reading, speaking, and writing sections), test takers listen to recordings and then answer multiple-choice questions (e.g., choosing the paragraph that best describes what they heard).

- Watson-Barker Listening Test (Watson & Barker, 1984), in which test takers listen to audiotapes of passages, conversations, and lectures and answer questions about the content and emotional meaning.

Reading Comprehension. An example measure is the Pearson Test of English, Academic (http://pearsonpte.com/PTEAcademic/Pages/home.aspx; http://pearsonpte.com/PTEAcademic/Tutorial/Documents/PTEA_Tutorial.pdf), in which test takers read academic passages (e.g., scientific articles, critical essays, reports) and answer multiple-choice questions about content. Another type of item presents several paragraphs, and the test taker must determine the logical order for the paragraphs.

Critical Thinking (defined here as logic-based reasoning). Logic-based reasoning (LBR) reflects the inferential processes of induction and deduction. LBR measures assess test takers' ability to draw conclusions based on material they read (e.g., which conclusion follows from the premise). Evidence on LBR reasoning is summarized below.

- Criterion-related validity: LBR tests have been found to predict supervisory ratings of performance for various job types, including protective services and administrative occupations. The meta-analytic estimate of operational validity (LBR-performance correlation corrected for criterion unreliability and range restriction) is .27 (Hayes & Reilly, 2002).

- Subgroup differences: Males score higher than females (*d*s ranging from .03 to .22). Whites score higher than Blacks (*d*s ranging from .38 to 1.0) and Hispanics (*d*s ranging from .56 to .66; Harris, Callen, & Busciglio, 2002; Paullin, Putka, & Tsacoumis, 2010).

Example LBR measures are HumRRO's LBR measures designed for federal law enforcement and analyst jobs (Paullin et al., 2010), in which test takers read passages based on job materials and answer questions requiring them to draw inferences based on the passages. All information required to answer questions correctly is found within the passages.

Critical Thinking (defined here as critical reasoning). Critical reasoning can be defined as an ability to understand and critically evaluate a wide range of information as well as to use the information in a logical way (http://www.shl.com/PDF_Documents/Product_Manuals/CRTBinformationsheet1.pdf). Evidence regarding critical reasoning includes criterion-related validity evidence from SHL. Across 10 studies conducted with samples from various jobs and industries, SHL reports an average correlation of .21 between their Critical Reasoning Test Battery and overall job performance (no corrections applied; http://www.shl.com/PDF_Documents/Product_Manuals/CRTBTechnicalManual.pdf).

An example measure is SHL's Critical Reasoning Test Battery (http://www.shl.com/PDF_Documents/Product_Manuals/CRTBinformationsheet1.pdf), in which test takers respond to items measuring verbal evaluation, numerical critical reasoning ability, and diagrammatic reasoning. Verbal items require test takers to read semi-technical reports and answer questions requiring inferences and conclusions about the information. Numerical items require test takers to interpret trends in numerical information. Diagrammatic reasoning requires non-verbal reasoning; test takers select the next symbol in symbolic sequences.

Social Perceptiveness (defined here as Emotional Intelligence). Emotional Intelligence (EI) has been defined as 'the ability to carry out accurate reasoning about emotions and the ability to use emotions and emotional knowledge to enhance thought' (Mayer, Roberts, & Barsade, 2008, p. 511). Ability-based measures of EI can be broken down into four dimensions: emotion perception (identifying emotions of others), emotion understanding (knowledge of how emotions change over time, how emotions differ, and which emotions are appropriate in a given situation), emotion facilitation (using emotions to achieve goals), and emotion regulation (control of one's emotions and their expression). Meta-analytic evidence regarding EI includes the following (Joseph & Newman, 2010):

- Criterion-related validity: Measures of emotion perception, emotion understanding, emotion facilitation, and emotion regulation predict job performance (ρs of .10, .15, .07, and .18, respectively, corrected for range restriction and unreliability of predictor and criterion). These relationships are stronger for jobs requiring high emotional labor (i.e., jobs that demand more regulation of feelings and emotional expressions). Operational validity (correlation corrected for range restriction and unreliability of criterion) of composite EI in predicting job performance is estimated to be .17.

- Subgroup differences: For composite EI, females score higher than males (d = -.47) and Whites score higher than Blacks (d = .99).

An example measure of EI is the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, Caruso, & Sitarenios, 2003), in which emotion perception is measured by tasks in which test-takers view faces, landscapes, and abstract designs and answer questions regarding the degree to which certain emotions are present in each face or picture. Emotion understanding is measured by tasks in which test-takers are asked to identify emotions that can combine to form other emotions or to select an emotion that results when another emotion intensifies. Emotion facilitation is measured by tasks that require test-takers to generate emotions and decide what sensations are associated with them and by tasks that require test-takers to decide what moods best accompany certain behaviors or cognitive tasks. Emotion regulation is measured by tasks that require judgments regarding actions that are most effective in achieving certain emotional outcomes or in managing others' feelings. Test items are scored by either a consensus method (based on responses of a normative sample) or an expert consensus method (based on a panel of expert judges' responses).

Writing. One method of assessing writing with selected response items is to present text to test takers and ask them editing questions. For example, a phrase may be underlined in a

paragraph, and the test taker responds to a multiple-choice item about the best phrase to use in that context. Example measures include:

- ACT's COMPASS placement tests (Davey, Godwin, & Mittelholtz, 1997), in which test takers view an essay on their computer screen, move the cursor to a section of the essay, and choose from a list of alternative ways to edit that section.

- U.S. Customs & Border Protection writing tests (http://www.cbp.gov/linkhandler/cgov/careers/study_guides/research/writing_skills.ctt/writing_skills.pdf), in which test takers respond to items on sentence construction, grammar, syntax, spelling, vocabulary, capitalization, punctuation, and organization of sentences or paragraphs. Content of stimulus materials is job-related, but no job knowledge is required to answer the questions. A criterion-related validation study (Bayless & Leaman, 2010) reported a correlation of .18 between writing score and supervisory ratings of job performance.

Open-ended Responses

Included in this category are written or computer-based knowledge or ability tests requiring open-ended responses. Some professional associations use open-ended essay questions to assess ethics-related knowledge and skill requirements. For example, some chiropractic state boards require test takers to respond to essay questions that assess understanding of ethics and boundaries issues such as fraud, doctors' duties, unprofessional conduct, and boundary violations (http://www.nbce.org/pdfs/post_lic_broch.pdf).

Knowledge and skill requirements describing ethical or declarative knowledge could be assessed with open-ended items, as could the following skills and knowledge:

Technology-related KSRs (e.g., Knowledge of literature access techniques, Knowledge of health information technology). An example measure is the U.S. Army Computer Survey (Singh & Dyer, 2002), in which soldiers view common icons in computer programs (e.g., a copy icon) and write descriptions about the icons' functions.

Active Listening (as well as Writing). An example measure is the Pearson Test of English, Academic (http://pearsonpte.com/PTEAcademic/Pages/home.aspx; http://pearsonpte.com/PTEAcademic/Tutorial/Documents/PTEA_Tutorial.pdf), in which test takers demonstrate listening ability through written responses about information they have heard. Item types include listening to a recording and then writing a summary of what was heard and dictating sentences as they are heard.

Speaking (as well as Active Listening and/or Reading Comprehension). Measures of speaking ability can also require either listening or reading skills, depending on the type of item. An example measure is the Pearson Test of English, Academic (http://pearsonpte.com/PTEAcademic/Pages/home.aspx; http://pearsonpte.com/PTEAcademic/Tutorial/Documents/PTEA_Tutorial.pdf), in which test takers either listen to or view information and must respond orally. Items requiring listening

include those that ask the test taker to listen to a recorded sentence and repeat it aloud, to listen to a lecture and then re-tell it in his/her own words, and to listen to questions and answer them aloud. Items requiring viewing information include those that ask the test taker to read aloud text that appears on the computer screen and to view an image and describe it aloud. Oral responses are scored on fluency, pronunciation, pace of delivery of speech, and language use.

Writing (and Persuasion). Open-ended writing tests typically take the form of essay tests, with test takers receiving a prompt and writing an essay that is scored by trained judges and/or computer scoring programs. The most commonly used computer scoring programs include Latent Semantic Analysis (LSA; Landauer & Dumais, 1997; Landauer, Foltz, & Laham, 1998), which provides essay scores based on the words contained in the essay (with the algorithm developed by identifying words that appear in essays of varying quality, as assessed by human raters), and programs measuring surface features (Chung & O'Neil, 1997), which base ratings on attributes of writing such as word and sentence length. Essays commonly require test takers to take a position on an issue or to write an opinion paper, so persuasion could be assessed in addition to writing ability in these cases. Example measures include:

- Pearson Test of English, Academic (http://pearsonpte.com/PTEAcademic/Pages/home.aspx; http://pearsonpte.com/PTEAcademic/Tutorial/Documents/PTEA_Tutorial.pdf), which contains writing tasks that require test takers to write essays on given topics or to summarize written text that the test taker has read. Responses are scored on characteristics such as grammar, spelling, vocabulary, language use, coherence, and logical development.

- U.S. Customs & Border Protection test (http://www.cbp.gov/linkhandler/cgov/careers/study_guides/research/writing_skills.ctt/writing_skills.pdf), in which test takers respond to prompts that include written materials (e.g., they review information and write an opinion paper) and photographs (e.g., they view a photograph of a street scene and write a paragraph describing the facts), with constraints on the length of response allowed. Expert raters score responses on characteristics including paragraph organization, presentation of ideas, grammar, syntax, punctuation, vocabulary, spelling, and capitalization.

Self- or Other-report Measures

Included in self- or other-report measures are written instruments requiring respondents or those who know them to provide estimates of knowledge, skills, or abilities (this does not include reports of past training, experience, etc.). Examples of knowledge and skills that can be measured by self- or other-report include:

Culture-related KSRs (e.g., Knowledge of socio-cultural issues that impact patient/client management). An example measure is the Cultural Intelligence Scale (CQS; Ang et al., 2007), a 20-item measure that assesses four cultural dimensions: cognitive (e.g., declarative and procedural cultural knowledge), behavioral (e.g., acting appropriately in different

cultures), motivational (e.g., self-efficacy in adapting to new cultures), and meta-cognitive (e.g., cultural mindfulness during intercultural interactions). Test takers respond to what extent they agree with each statement. CQS scores have been found to predict expatriate task performance and intercultural negotiation (e.g., Ang et al., 2007).

Technology-related KSRs (e.g., Knowledge of literature access techniques, Knowledge of health information technology). An example measure is the Record of Pre-Enlistment Training and Experience (REPETE) for Army use (Russell, Le, & Knapp, 2005). The REPETE includes sections with training and certifications as well as self-reports of level of skill in ten categories of computer skills.

Ethics-related KSRs (e.g., Knowledge of obligations for reporting illegal, unethical, or unprofessional behaviors, Knowledge of state and federal laws, Knowledge of professional ethical standards), Active Listening, Speaking, Critical Thinking, Social Perceptiveness, Time Management, Coordination, Writing, Persuasion, Negotiation, or Service Orientation. Example measures include evaluations of medical students during training (e.g., McGill, van der Vleuten, & Clarke, 2011). During training within certain medical specialties, medical students are often rated by supervisors on KSRs such as knowledge in specific domains, empathy, time management, knowledge of ethical responsibilities, teaching ability, and communication skills

Social Perceptiveness (defined here as Emotional Intelligence). Self-report measures of EI include those that are ability-based and those that include a mix of ability, personality, and affect capabilities (i.e., mixed measures). Self-report ability measures include dimensions similar to those assessed by the ability-based measures (e.g., emotion perception, emotion understanding, emotion facilitation, emotion regulation). Self-report mixed measures include traits such as motivation, self-esteem, or impulse control (Mayer et al., 2008). Meta-analytic evidence includes the following (Joseph & Newman, 2010):

- Criterion-related validity: Operational validity (correlation corrected for range restriction and unreliability of criterion) of self-report ability EI measures in the prediction of job performance is estimated to be .22. Operational validity for self-report mixed EI measures is .42. These relationships are stronger for jobs requiring high emotional labor.

- Subgroup differences: For both self-report ability and self-report mixed EI measures, there are not substantial male-female differences (d = -.01). Blacks score higher than Whites on self-report ability measures (d = -.31), and Whites score higher than Blacks on self-report mixed measures (d = .22).

An example mixed measure of EI is the Emotional Quotient Inventory (EQ-i; Bar-On, 2006; see http://www.mhs.com/ei.aspx), in which test takers rate 133 items on a 5-point response scale, ranging from very seldom/not true of me to very often true of me/true of me. The responses result in a total score and 5 scale scores: Intrapersonal, Interpersonal, Stress Management, Adaptability, and General Mood.

Selected Response Simulations

Included in this category are instruments that place test takers into hypothetical situations and ask them to evaluate actions that may be taken. Other professional associations use selected response simulations to assess knowledge and skill requirements exhibited in common professional scenarios. For example, the National Certified School Counselor Examination (NCSCE) includes simulated school counseling cases that consist of information gathering and decision making sections and are followed by multiple-choice questions (http://www.nbcc.org/NCSCE).

Situational Judgment Tests

Situational Judgment Tests (SJTs) present written descriptions of scenarios that may occur in a role and require test takers to evaluate various responses to those incidents, for example, selecting the option that describes what they would do or what one should do in the scenario. Meta-analytic evidence (for SJTs across all constructs measured) includes:

- Criterion-related validity: McDaniel, Morgeson, Finnegan, Campion, and Braverman (2001) present a correlation (corrected for criterion unreliability) of .34 between SJTs and job performance.

- Subgroup differences: Across various SJT measures, meta-analytic estimates of subgroup differences indicate that females outperform males (d = -.11) and that Whites outperform Blacks (d = .38) and Hispanics (d = .24; Whetzel, McDaniel, & Nguyen, 2008).

SJTs are typically designed to measure noncognitive skills, including the following:

Culture-related KSRs (e.g., Knowledge of socio-cultural issues that impact patient/client management). An example measure is the Cross-culture social intelligence SJT (Ascalon, Schleicher, & Born, 2008). This instrument was designed to measure ethnocentrism (extent to which a person is judgmental of others who are different and is unwilling to alter behavior) and empathy (extent to which a person can relate to others who are different and alter behavior based on others). Scenarios include several cultures and depict cross-culture interactions, with responses varying on levels of ethnocentrism and empathy.

KSRs related to teamwork (e.g., Critical Thinking, Social Perceptiveness, Time Management, Coordination, Negotiation, Persuasion). An example measure is the Teamwork-KSA Test (Stevens & Campion, 1994; http://www.creativeorgdesign.com/tests_page.htm?id=233&title=Teamwork_-_Knowledge,_Skills,_Attitudes), a 35-item instrument that includes scenarios designed to measure the KSAs required for effective teamwork, including conflict resolution, collaborative problem solving, communication, goal setting and performance management, and planning and task coordination. Test takers select which of four response options is the best response to the scenario. In validation studies with two samples, the Teamwork-KSA Test was found to predict performance (including teamwork performance, technical performance, peer-rated performance, and overall performance), with correlations ranging from .21 to .56 (Stevens & Campion, 1999).

Service Orientation. An example measure is ServiceFirst (People Focus, 1998; http://www.assessio.us/assess_service.php), a 50-item instrument designed to measure customer service orientation or potential, which includes customer relations dimensions related to being active (seeking and acting on service opportunities), being polite (demonstrating courtesy, empathy, and rapport building), being helpful (responding to customer needs and assisting others), being flexible (responding to customer needs when faced with competing demands), and being sociable and people-oriented. Test takers complete two sections; the first contains self-report items, and the second contains SJT items. The SJT items present scenarios and ask test takers to rate the likelihood that they would perform various actions in response to a given scenario. The test developer reports that validity studies for 12 different jobs have resulted in correlations between ServiceFirst scores and job performance ranging from .20 to .45.

Multimedia Simulations

Included in multimedia simulations are video-based and computer-based scenarios that require respondents to evaluate potential responses to the situations presented. The content may be interactive (i.e., the scenarios change based on respondents' previous decisions) or fixed (i.e., scenarios are the same, regardless of respondents' decisions). Knowledge and skills that have been measured in multimedia simulations include:

Culture-related KSRs (e.g., Knowledge of socio-cultural issues that impact patient/client management). Culture assimilators, which present realistic scenarios that one may encounter in a different culture, are used to teach appropriate responses in unfamiliar cultural encounters. Although typically used for cross-cultural training purposes, this type of simulation could also be used for selection purposes. An example measure is the United States Army Research Institute's culture-general training program (Rosenthal et al., 2007), a simulation was designed to improve soldiers' cross-cultural perspective taking. Soldiers listen to and see photos of scenarios depicting interactions between people of different cultures, respond to multiple-choice questions about the interactions they see, and receive feedback on their responses.

Communication Skills (e.g., Active Listening, Social Perceptiveness). Example measures include video-based SJTs designed to measure interpersonal and communication skills for medical school applicants in Belgium (Lievens, Buyse, & Sackett, 2005). Applicants watch short videotaped vignettes depicting interpersonal situations that physicians may encounter on the job. After the video scenario is presented, applicants respond to multiple-choice questions related to the scenario. Operational validities (corrected for range restriction and criterion unreliability) for medical school performance were: .08 for first year GPA, .09 for second year GPA, .20 for third year GPA, and .35 for fourth year GPA. These validities were higher for curriculum with a substantial interpersonal skills component.

Conflict Management Skills (e.g., Social Perceptiveness, Coordination, Persuasion, Negotiation). An example measure is Conflict Resolution Skills (Drasgow, Olson-Buchanan, & Moberg, 1999), in which test takers watch a 1-3 minute video scene depicting conflict, which stops at a critical point in the scene; then test takers must choose one of four options for action that they would do in the given situation. The scene continues, based on the option the test taker

has chosen, and pauses again later in the scene, at which point the test taker answers another question. The authors report a correlation of .26 between the instrument and supervisor-rated performance on handling conflict.

Negotiation. An example measure is the ELECT BiLAT (Hill et al., 2006), a game-based simulation developed for the Army that allows soldiers to practice negotiating across different cultural contexts and has been used for training purposes only.

Performance Assessments

Included in this category are simulations in which respondents must exhibit behaviors in response to hypothetical scenarios (rather than stating what they would do in a hypothetical situation, as in selected response simulations). Several professional associations use performance assessments for licensure exams. For example, those obtaining medical licensure must complete the Clinical Skills Examination of the United States Medical Licensing Examination (http://www.usmle.org/Examinations/index.html), an exam that includes clinical skills exams with standardized patients being presented to test takers, who are rated on their ability to gather information from patients, perform exams, and communicate their findings. Similarly, the National Board of Examiners in Optometry uses patient exams in its Clinical Skills Evaluation required for optometric licensure (http://www.optometry.org/part_cse_matrix.cfm); candidates are observed doing patient exams and are rated on communication, affective skills, psychomotor skills, and interpretation of clinical findings.

Assessment Centers

There are a variety of Assessment Center (AC) exercises that could measure various skills that were identified as important for entry level PTs/PTAs. For example, mock presentations could be used to assess communication skills. Client meetings could be used to assess service orientation. Exercises requiring a strengths, weaknesses, opportunities, and threats (SWOT) analysis require critical thinking skills. In-basket exercises require participants to review reports, messages, emails, and/or other communications and take action on the issues or problems presented. Simulated coaching meetings require participants to role-play scenarios in which they are trying to resolve issues with subordinates. Leaderless group discussions require participants to work with others in a group to develop solutions to the issues or problems presented. The exercise may require collaboration or competition with others in the group. Evidence includes:

- Criterion-related validity: Meta-analytic estimates of true validities (corrected for both predictor and criterion unreliability and range restriction) for AC dimensions in predicting job performance range from .25 to .39 (Arthur, Day, McNelly, & Edens, 2003). True validities for AC dimensions related to PT/PTA skills include:
    - Problem solving, including analytical skills and critical thinking: $\rho = .39$
    - Influencing others, including negotiating and persuading others to adopt certain perspectives: $\rho = .38$
    - Organizing and planning, including coordinating and managing time and resources for oneself and others: $\rho = .37$

- Communication, including both oral and written communication: ρ = .33

- Subgroup differences: Across all AC dimensions, meta-analytic estimates of subgroup differences indicate that females outperform males (d = -.19; Dean, Roth, & Bobko, 2008). Whites outperform both Blacks (d = .52) and Hispanics (d = .28).

Most ACs assess multiple skills, such as the following:

Active Listening, Speaking, Reading Comprehension, Critical Thinking, Time Management, Writing, Persuasion, or Negotiation. Example measures include:

- The Department of Commerce's AC for Foreign Commercial Service Officers (Merit Systems Protection Board, 2009), in which participants complete a structured interview, a leaderless group exercise, an electronic in-basket, and a writing exercise. Assessors rate participants on critical competencies identified through a job analysis, including written and oral communication, problem solving/decision making, and working with and leading others.

- The U.S. Customs and Border Protection's Video-Based Test for officers and agricultural specialists (Merit Systems Protection Board, 2009), in which applicants watch videos of job-related scenarios and after each scenario have 45 seconds to act out what they would do in response. Applicants' role playing responses are captured on video and rated on competencies including oral and interpersonal skills.

Other Performance Assessments

In addition to ACs, other example performance assessments include those that measure:

Technology-related KSRs (e.g., Knowledge of literature access techniques, Knowledge of health information technology). Various assessments have been used to measure job-related computer skills. Evidence provided for simulations measuring technology skills is typically content validity-related and includes expert judgments. Example measures include:

- ETS's iSkills Assessment (Katz, 2007; http://www.ets.org/iskills/about), which was developed to measure Information and Communication Technology literacy skills, which ETS defines as: the ability to use digital technology, communication tools, and/or networks to access, manage, integrate, evaluate, create, and communicate information ethically and legally in order to function in a knowledge society. iSkills simulates scenarios in which test takers must use digital technology to solve problems, with example scenarios including finding references that are relevant to a particular topic, summarizing information from several different types of sources, and developing presentation slides based on information that is located. Competencies measured by the items include: defining what information is needed, accessing that information, evaluating its accuracy or relevance, managing or organizing it, creating new ways to display it, integrating information from multiple sources, and communicating. Each response is scored as a 0 (poor), .5 (partially good), or 1 (good), and item scores are added to attain a total score.

- Internet and Computing Core Certification exam (IC^3; http://www.certiport.com/Portal/desktopdefault.aspx?page=common/pagelibrary/IC3_GS3.html), which was designed to measure digital literacy skills that are needed in academic and business environments and includes selected response knowledge items in addition to the performance-based items. The exam includes three subtests: Computing Fundamentals (e.g., computer hardware, software, operating systems), Key Applications (e.g., word processing functions, spreadsheet features, presentation software), and Living Online (e.g., communication networks, the internet, email).

Active Listening, Speaking, Critical Thinking, Social Perceptiveness, Coordination, and Service Orientation. An example measures is the Telephone Assessment Program (TAP) for the Internal Revenue Service's Customer Service Representative entry-level position (Merit Systems Protection Board, 2009), in which job applicants review information about the customer service position, including answering tax questions for the public via telephone. They then receive standardized calls and must carry out the duties of the position for one hour. Applicants are rated by assessors on seven competencies, including their performance on gathering information from callers, providing detailed and accurate information, expressing themselves clearly, and conveying empathy.

Measures of Past Performance, Training, Education, and/or Experience

Included in this category are instruments that gather information about a respondent's past behaviors. This type of measure is used by other professional associations to measure knowledge and skill requirements related to ethics. For example, to attain certification as an occupational therapist, applicants must complete a Character Review in which they respond to questions about past professional suspensions, recklessness, college misconduct, and criminal history (http://www.nbcot.org/pdf/CharacterQuestions-examappsubmitted.pdf).

Biodata/Accomplishment Records

Biodata measures and accomplishment records ask candidates to report past behavior, for example, related to past education or experience. Whereas biodata measures typically have selected response items, accomplishment records are open-ended, written measures that ask respondents to describe their accomplishments in certain domains. Provided with a performance domain, respondents describe a relevant situation, their response, and the outcome of their response. They are sometimes asked to provide contact information of someone who could verify their response. Response scoring is typically based on experts' assessments of themes that reflect various performance levels. Knowledge and skills that have been assessed with biodata and/or accomplishment records include:

Technology-related KSRs (e.g., Knowledge of literature access techniques, Knowledge of health information technology). An example measure is the U.S. Army Computer Survey (Singh & Dyer, 2002), in which soldiers respond to questions about their experiences with computers, for example how often they use various software and hardware.

Communication Skills, Critical Thinking, Coordination, Persuasion, and Negotiation. Example measures include:

- Accomplishment records developed for attorneys (Hough, 1984), in which respondents describe major accomplishments that show their competence for several job dimensions, including researching/investigating, using knowledge, planning and organizing, writing, oral communications, assertive advocacy, working independently, and hard work/dedication. Hough found that accomplishment record scores predicted job performance (correlation of .25 between overall accomplishment record evaluation and overall job performance) and pay (correlation of .32 between overall accomplishment record evaluation and pay grade).

- OPM's Individual Achievement Record for Federal hiring (Dye, 1990), which includes 112 multiple-choice items on educational background, work-related skills and abilities, and achievements in interpersonal endeavors. The measure is empirically-keyed.

Service Orientation. An example measure is Biodata Online's Customer Service Profile (http://www.biodataonline.com/prods&services.htm), a 92-item biodata questionnaire that was developed to predict performance for call center employees.

Portfolios

Portfolios include evidence of past performance in certain domains. They can include samples of work or videotapes of performance. Depending on the materials required in a portfolio, multiple skills could be assessed, including:

Culture-related KSRs (e.g., Knowledge of socio-cultural issues that impact patient/client management), Interpersonal skills (e.g., Active Listening, Speaking, Social Perceptiveness, Coordination, Writing, Persuasion, Negotiation), or Service Orientation. An example measure is the National Board of Professional Teaching Standards (Jaeger, 1998). When obtaining teaching licensure, candidates submit a portfolio with six items, including four classroom-based entries (e.g., videotapes of performance, student work samples) and two items regarding work outside the classroom (e.g., evidence of work done with students' families and the community). Assessors score each of the six portfolio items on a 12-point rating scale.

Structured Interviews

Structured interviews could be used to assess how applicants have responded to past situations, how they may respond to future job situations, or the amount of knowledge they have within certain domains. Depending on the questions they include, interviews could be considered self-report measures of knowledge or ability, open-ended simulations requiring descriptions of actions to be taken in hypothetical situations, or self-reports of past performance and behavior. In a meta-analytic review of constructs assessed in interviews, Huffcutt, Conway, Roth, and Stone (2001) identified mental capability (e.g., ability to learn, organize, evaluate information),

knowledge and skills, personality tendencies, social skills (e.g., oral communication, persuasion, negotiation), interests and preferences, organizational fit, and physical attributes.

Meta-analytic evidence indicates that highly structured interviews tend to result in higher predictive validities than interviews with less structure. For entry level jobs, Huffcutt and Arthur (1994) provide an estimated correlation (corrected for criterion unreliability and range restriction) of .57 between the most structured interviews and supervisory ratings of job performance.

An example measure is DDI's Targeted Selection behavioral interviewing system (http://www.ddiworld.com/products_services/targetedselection.asp). DDI provides a system for developing behavioral interviews as well as interviewer training.

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Appendix I

Descriptions of Final Test Blueprint Categories

CARDIOVASCULAR/PULMONARY & LYMPHATIC SYSTEMS

Physical Therapy Data Collection. This category refers to knowledge of the types and applications of cardiovascular/pulmonary and lymphatic systems tests/measures, including outcome measures, according to current best evidence. The category includes the reaction of the cardiovascular/pulmonary and lymphatic systems to tests/measures and the mechanics of body movement as related to the cardiovascular/pulmonary and lymphatic systems. Information covered in these areas supports appropriate and effective patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Cardiovascular/pulmonary systems tests/measures, including outcome measures, and their applications according to current best evidence
- Anatomy and physiology of the cardiovascular/pulmonary systems as related to tests/measures
- Movement analysis as related to the cardiovascular/pulmonary systems (e.g., rib cage excursion)

Diseases/Conditions that Impact Effective Treatment. This category refers to the essential scientific principles and knowledge of diseases/conditions that serve as the foundation for understanding the involvement of the cardiovascular/pulmonary and lymphatic systems in the treatment of patients/clients for rehabilitation, health promotion, and performance across the lifespan.

- Cardiovascular/pulmonary systems diseases/conditions and their pathophysiology to carry out the established plan of care
- Lymphatic system diseases/conditions and their pathophysiology to carry out the established plan of care
- Nonpharmacological medical management of the cardiovascular/pulmonary systems (e.g., diagnostic imaging, laboratory test values, other medical tests, surgical procedures)
- Pharmacological management of the cardiovascular/pulmonary systems
- Nonpharmacological medical management of the lymphatic system (e.g., diagnostic imaging, laboratory test values, other medical tests, surgical procedures)

Interventions. This category refers to cardiovascular/pulmonary and lymphatic systems interventions (including types, applications, responses, and potential complications), according to current best evidence, as well as the impact on the cardiovascular/pulmonary and lymphatic systems of interventions performed on other systems in order to support patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Cardiovascular/pulmonary systems physical therapy interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence
- Anatomy and physiology of the cardiovascular/pulmonary systems as related to physical therapy interventions, daily activities, and environmental factors
- Secondary effects or complications from physical therapy and medical interventions on the cardiovascular/pulmonary systems
- Secondary effects or complications on the cardiovascular/pulmonary systems from physical therapy and medical interventions used on other systems
- Lymphatic system physical therapy interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence

- Anatomy and physiology of the lymphatic system as related to physical therapy interventions, daily activities, and environmental factors
- Secondary effects or complications from physical therapy and medical interventions on the lymphatic system
- Secondary effects or complications on the lymphatic system from physical therapy and medical interventions used on other systems

MUSCULOSKELETAL SYSTEM

Physical Therapy Data Collection. This category refers to knowledge of the types and applications of musculoskeletal system tests/measures, including outcome measures, according to current best evidence. The category includes the reaction of the musculoskeletal system to tests/measures and the mechanics of body movement as related to the musculoskeletal system. Information covered in these areas supports appropriate and effective patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Musculoskeletal system tests/measures, including outcome measures, and their applications according to current best evidence
- Anatomy and physiology of the musculoskeletal system as related to tests/measures
- Movement analysis as related to the musculoskeletal system
- Joint biomechanics and their applications

Diseases/Conditions that Impact Effective Treatment. This category refers to the essential scientific principles and knowledge of diseases/conditions that serve as the foundation for understanding the involvement of the musculoskeletal system in the treatment of patients/clients for rehabilitation, health promotion, and performance across the lifespan.

- Muscular and skeletal diseases/conditions and their pathophysiology to carry out the established plan of care
- Connective tissue diseases/conditions and their pathophysiology to carry out the established plan of care
- Nonpharmacological medical management of the musculoskeletal system (e.g., diagnostic imaging, laboratory test values, other medical tests, surgical procedures)
- Pharmacological management of the musculoskeletal system

Interventions. This category refers to musculoskeletal system interventions (including types, applications, responses, and potential complications), according to current best evidence, as well as the impact on the musculoskeletal system of interventions performed on other systems in order to support patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Musculoskeletal system physical therapy interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence
- Anatomy and physiology of the musculoskeletal system as related to physical therapy interventions, daily activities, and environmental factors
- Secondary effects or complications from physical therapy and medical interventions on the musculoskeletal system
- Secondary effects or complications on the musculoskeletal system from physical therapy and medical interventions used on other systems

NEUROMUSCULAR & NERVOUS SYSTEMS

Physical Therapy Data Collection. This category refers to knowledge of the types and applications of neuromuscular/nervous systems tests/measures, including outcome measures, according to current best evidence. The category includes the reaction of the neuromuscular/nervous systems to tests/measures and the mechanics of body movement as related to the neuromuscular/nervous systems. Information covered in these areas supports appropriate and effective patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Neuromuscular/nervous systems tests/measures, including outcome measures, and their applications according to current best evidence
- Anatomy and physiology of the neuromuscular/nervous systems as related to tests/measures
- Movement analysis as related to the neuromuscular/nervous systems

Diseases/Conditions that Impact Effective Treatment. This category refers to the essential scientific principles and knowledge of diseases/conditions that serve as the foundation for understanding the involvement of the neuromuscular/nervous systems in the treatment of patients/clients for rehabilitation, health promotion, and performance across the lifespan.

- Neuromuscular/nervous systems (CNS, PNS, ANS) diseases/conditions and their pathophysiology to carry out the established plan of care
- Nonpharmacological medical management of the neuromuscular/nervous systems (e.g., diagnostic imaging, laboratory test values, other medical tests, surgical procedures)
- Pharmacological management of the neuromuscular/nervous systems

Interventions. This category refers to neuromuscular/nervous systems interventions (including types, applications, responses, and potential complications), according to current best evidence, as well as the impact on the neuromuscular/nervous systems of interventions performed on other systems in order to support patient/client management for rehabilitation, health promotion, and performance across the lifespan**.**

- Neuromuscular/nervous systems physical therapy interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence
- Anatomy and physiology of the neuromuscular/nervous systems as related to physical therapy interventions, daily activities, and environmental factors
- Secondary effects or complications from physical therapy and medical interventions on the neuromuscular/nervous systems
- Secondary effects or complications on the neuromuscular/nervous systems from physical therapy and medical interventions used on other systems
- Motor control as related to neuromuscular/nervous systems physical therapy interventions
- Motor learning as related to neuromuscular/nervous systems physical therapy interventions

INTEGUMENTARY SYSTEM

Physical Therapy Data Collection. This category refers to knowledge of the types and applications of integumentary system tests/measures, including outcome measures, according to

current best evidence. The category includes the reaction of the integumentary system to tests/measures and the mechanics of body movement as related to the integumentary system. Information covered in these areas supports appropriate and effective patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Integumentary system tests/measures, including outcome measures, and their applications according to current best evidence
- Anatomy and physiology of the integumentary system as related to tests/measures
- Movement analysis as related to the integumentary system (e.g., friction, shear, pressure, and scar mobility)

Diseases/Conditions that Impact Effective Treatment. This category refers to the essential scientific principles and knowledge of diseases/conditions that serve as the foundation for understanding the involvement of the integumentary system in the treatment of patients/clients for rehabilitation, health promotion, and performance across the lifespan.

- Integumentary system diseases/conditions and their pathophysiology to carry out the established plan of care
- Nonpharmacological medical management of the integumentary system (e.g., diagnostic imaging, laboratory test values, other medical tests, surgical procedures)
- Pharmacological management of the integumentary system

Interventions. This category refers to integumentary system interventions (including types, applications, responses, and potential complications), according to current best evidence, as well as the impact on the integumentary system of interventions performed on other systems in order to support patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Integumentary system physical therapy interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence
- Anatomy and physiology of the integumentary system as related to physical therapy interventions, daily activities, and environmental factors
- Secondary effects or complications from physical therapy and medical interventions on the integumentary system
- Secondary effects or complications on the integumentary system from physical therapy and medical interventions used on other systems

METABOLIC & ENDOCRINE SYSTEMS

Diseases/Conditions that Impact Effective Treatment. This category refers to the essential scientific principles and knowledge of diseases/conditions that serve as the foundation for understanding the involvement of the metabolic and endocrine systems in the treatment of patients/clients for rehabilitation, health promotion, and performance across the lifespan.

- Metabolic and endocrine systems diseases/conditions and their pathophysiology to carry out the established plan of care
- Nonpharmacological medical management of the metabolic and endocrine systems (e.g., diagnostic imaging, laboratory test values, other medical tests, surgical procedures)
- Pharmacological management of the metabolic and endocrine systems

Interventions. This category refers to metabolic and endocrine systems interventions (including types, applications, responses, and potential complications), according to current best evidence, as well as the impact on the metabolic and endocrine systems of interventions performed on other systems in order to support patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Metabolic and endocrine systems physical therapy interventions and their applications for rehabilitation, health promotion, and performance according to current best evidence
- Anatomy and physiology of the metabolic and endocrine systems as related to physical therapy interventions, daily activities, and environmental factors
- Secondary effects or complications from physical therapy and medical interventions on the metabolic and endocrine systems
- Secondary effects or complications on the metabolic and endocrine systems from physical therapy and medical interventions used on other systems

GASTROINTESTINAL SYSTEM

Diseases/Conditions that Impact Effective Treatment. This category refers to the essential scientific principles and knowledge of diseases/conditions that serve as the foundation for understanding the involvement of the gastrointestinal system in the treatment of patients/clients for rehabilitation, health promotion, and performance across the lifespan.

- Gastrointestinal system diseases/conditions and their pathophysiology to carry out the established plan of care
- Nonpharmacological medical management of the gastrointestinal system (e.g., diagnostic imaging, laboratory test values, other medical tests, surgical procedures)
- Pharmacological management of the gastrointestinal system

Interventions. This category refers to gastrointestinal system interventions (including types, applications, responses, and potential complications), according to current best evidence, as well as the impact on the gastrointestinal system of interventions performed on other systems in order to support patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Gastrointestinal system physical therapy interventions and their applications for rehabilitation and health promotion according to current best evidence (e.g., positioning for reflux prevention, bowel programs)
- Anatomy and physiology of the gastrointestinal system as related to physical therapy interventions, daily activities, and environmental factors
- Secondary effects or complications from physical therapy and medical interventions on the gastrointestinal system
- Secondary effects or complications on the gastrointestinal system from physical therapy and medical interventions used on other systems

GENITOURINARY SYSTEM

Diseases/Conditions that Impact Effective Treatment. This category refers to the essential scientific principles and knowledge of diseases/conditions that serve as the foundation for understanding the involvement of the genitourinary system in the treatment of patients/clients for rehabilitation, health promotion, and performance across the lifespan.

- Genitourinary system diseases/conditions and their pathophysiology to carry out the established plan of care
- Nonpharmacological medical management of the genitourinary system (e.g., diagnostic imaging, laboratory test values, other medical tests, surgical procedures)
- Pharmacological management of the genitourinary system

Interventions. This category refers to genitourinary system interventions (including types, applications, responses, and potential complications), according to current best evidence, as well as the impact on the genitourinary system of interventions performed on other systems in order to support patient/client management for rehabilitation, health promotion, and performance across the lifespan.

- Genitourinary system physical therapy interventions and their applications for rehabilitation and health promotion according to current best evidence (e.g., bladder programs, biofeedback, pelvic floor retraining)
- Anatomy and physiology of the genitourinary system as related to physical therapy interventions, daily activities, and environmental factors
- Secondary effects or complications from physical therapy and medical interventions on the genitourinary system
- Secondary effects or complications on the genitourinary system from physical therapy and medical interventions used on other systems

SYSTEM INTERACTIONS

Diseases/Conditions that Impact Effective Treatment. This category refers to the essential scientific principles and knowledge of diseases/conditions that serve as the foundation for understanding system interactions in the treatment of patients/clients for rehabilitation, health promotion, and performance across the lifespan.

- Diseases/conditions where the primary impact is on more than one system to carry out the established plan of care
- Impact of comorbidities/coexisting conditions on patient/client management (e.g., diabetes and hypertension, obesity and arthritis, hip fracture and dementia)
- Psychological and psychiatric conditions that impact patient/client management (e.g., depression, schizophrenia)
- Nonpharmacological medical management of multiple systems (e.g., diagnostic imaging and other medical tests, surgical procedures)
- Pharmacological management of multiple systems, including polypharmacy

EQUIPMENT & DEVICES

This category refers to the different types of equipment and devices, use requirements, and/or contextual determinants, according to current best evidence, as well as any other influencing factors involved in the application of equipment and devices, in order to support patient/client treatment and management decisions for rehabilitation, health promotion, and performance across the lifespan.

- Assistive and adaptive devices
- Prosthetic devices
- Protective, supportive, and orthotic devices

THERAPEUTIC MODALITIES

This category refers to the different types of therapeutic modalities, use requirements, and/or contextual determinants, according to current best evidence, as well as any other influencing factors involved in the application of therapeutic modalities, in order to support patient/client treatment and management decisions for rehabilitation, health promotion, and performance across the lifespan.

- Thermal modalities
- Iontophoresis
- Electrotherapy modalities, excluding iontophoresis
- Phonophoresis
- Ultrasound modalities, excluding phonophoresis
- Mechanical modalities (e.g., mechanical motion devices, traction devices)
- Biofeedback
- Electromagnetic radiation (e.g., diathermy)
- Pneumatic compression modalities

SAFETY & PROTECTION

This category refers to the critical issues involved in patient/client safety and protection and the responsibilities of health-care providers to ensure that patient/client management and health-care decisions take place in a secure environment.

- Factors influencing safety and injury prevention
- Function, implications, and precautions related to intravenous lines, tubes, catheters, and monitoring devices
- Emergency preparedness (e.g., CPR, first aid, disaster response)
- Infection control procedures (e.g., standard/universal precautions, isolation techniques, sterile technique)
- Signs/symptoms of physical, sexual, and psychological abuse and neglect

PROFESSIONAL RESPONSIBILITIES

This category refers to the responsibilities of health-care providers to ensure that patient/client management and health-care decisions take place in a trustworthy environment.

- Standards of documentation
- Patient/client rights (e.g., ADA, IDEA, HIPAA)
- Human resource legal issues (e.g., OSHA, sexual harassment)
- Roles and responsibilities of physical therapist assistants in relation to physical therapists and other health-care professionals
- Roles and responsibilities of other health-care professionals and support staff

RESEARCH & EVIDENCE-BASED PRACTICE

This category refers to the knowledge of basic research methods and data collection techniques necessary for interpretation of information sources and practice research to support patient/client management decisions fundamental to evidence-based practice.

- Knowledge of basic research concepts
- Knowledge of data collection techniques (e.g., surveys, direct observation)