Practice Analysis of Certified Technicians in the Disciplines of Orthotics and Prosthetics

American Board for Certification in Orthotics, Prosthetics & Pedorthics
330 John Carlyle Street, Suite 210
Alexandria, VA 22314–2747
703-836-7114
abcop.org

Practice Analysis Task Force
Robert Carlile, Chair, CPA, CTPO
Louise Bensley, CTPO
Ryan Calococci, CTPO
Lonny Damewood, CTP
Dennis Dillard, CTO, C.Ped.
Scott French, CPOA, CTO
Timothy E. Miller, CPO
Joe See, CTP
Tony Wickman, CTPO
Scott Wimberley, CPA, CTPO

American Board for Certification in Orthotics, Prosthetics and Pedorthics, Inc.
Catherine A. Carter, MA, Executive Director
Stephen B. Fletcher, CPO, LPO, Director of Clinical Resources

Professional Examination Service
Carla M. Caro, MA
Sandra Greenberg, PhD

Table of Contents

Acknowledgements....I
Introduction....II

SECTION ONE

Results Related to Professional Background Work Setting and Demographic Information....1

SECTION TWO

Results Related to Domains, Tasks, Knowledge and Skill Statements.... 8

SECTION THREE

Results Related to Practice Areas and Devices 18
Highlights Results Related to Professional Background, Work Setting and Demographic Information.... 25
Highlights Related to Domains, Tasks, Knowledge and Skill Statements 26
Highlights Related to Orthotic and Prosthetic Practice Areas and Devices....27

TABLE OF TABLES

Table 1: Gender of Respondents 1
Table 2 Age of Respondents 1
Table 3 Racial/Ethnic Background 2
Table 4 Highest Educational Degree in any Discipline 2
Table 5 Years of Experience 2
Table 6 Primary Work Setting.... 3
Table 7 Primary Position 3
Table 8 Percentage of Work Time – Orthotic Perspective 4
Table 9 Percentage of Work Time – Prosthetic Perspective 4
Table 10 Number of Technicians at Primary Work Setting....5
Table 11 Number of Practitioners at Primary Work Setting....5
Table 12 ABC Credential(s) Held by Respondents 6
Table 13 Percentage of Orthoses/Prostheses Fabricated Using CAD/CAM 6
Table 14 Percentage of Orthotic Devices Fabricated Onsite or at a Central Fabrication Facility 7
Table 15 Percentage of Prosthetic Devices Fabricated Onsite or at a Central Fabrication Facility 7
Table 16 Descriptive Statistics for Domain: Percentage of Time and Criticality 9

Table 17 Task Frequency and Criticality Ratings 12
Table 18 Percent of Time in Orthotic Practice Areas and Devices 19
Table 19 Percentage Performing Each Activity with Respect to Orthotic Devices During Past 12 Months 20
Table 20 Percentage of Time in Prosthetic Practice Areas and Devices 23
Table 21 Percentage Performing Each Activity with Respect to Prosthetic Devices During Past 12 Months 24

LIST OF FIGURES

Figure 1 Percentage of Time in Orthotic Practice Areas 18
Figure 2 Percentage of Time in Prosthetic Practice Areas 22

Acknowledgements

On behalf of the American Board for Certification in Orthotics, Prosthetics and Pedorthics, Inc. (ABC) I am pleased to present this Practice Analysis of Certified Technicians in the Disciplines of Orthotics and Prosthetics. This report describes the contemporary work of ABC certified orthotic and prosthetic technicians practicing in the United States. It represents the culmination of months of planning, execution, data analyses and writing.

A project of this magnitude depends on the hard work and commitment of many professionals. We are indebted to the ABC Practice Analysis Task Force (PATF) for the wisdom and direction it provided. Its members— Robert Carlile, Chair, CPA, CTPO, Louise Bensley, CTPO, Ryan Calococci, CTPO, Lonny Damewood, CTP, Dennis Dillard, CTO, C.Ped., Scott French, CPOA, CTO, Timothy E. Miller, CPO, Joe See, CTP, Tony Wickman, CTPO, Scott Wimberley, CPA, CTPO—worked with us throughout the conduct of the study.

Finally, we are grateful to ABC staff, including Catherine A. Carter, MA, Executive Director and Stephen B. Fletcher, CPO, LPO, Director of Clinical Resources. They both provided thoughtful and consistent support for the study.

This project represents a substantial investment of ABC's financial resources and personnel as related to our efforts in continuing to develop exemplary examination programs as well as providing information to primary and continuing education programs. We are proud to present this to the profession.

Eric Ramcharran, CPO
President

Introduction

In 2016 the American Board for Certification in Orthotics, Prosthetics and Pedorthics, Inc. (ABC), contracted with Professional Examination Service (ProExam) to develop and implement a practice analysis and validation study for orthotic and prosthetic technicians.

ABC performed technician practice analyses and validation studies in 1999 and in 2009. In 2016, as planned, technicians were resurveyed in order to identify changes related to orthotic and prosthetic care, available componentry and the technology in use today. The respondents to the survey have provided a great service to the profession. It is imperative that technicians and the profession recognize the importance of studies such as this that provide vital information to standard setting organizations.

WHY DO A PRACTICE ANALYSIS STUDY?

The goal of the practice analysis is to determine current trends in the provision of prosthetic and orthotic services by technicians.

WHY DO A VALIDATION STUDY?

The goal of the validation study was to identify priorities unique in the delivery of orthotic and prosthetic care, e.g., What highly critical tasks are performed by all technicians? What subset of knowledge and skills is essential? Which procedures are most frequently implemented?

WHAT WILL ABC DO WITH THE RESULTS OF THE STUDY?

The results are being used to generate defensible credentialing test specifications designed for entry-level orthotic and prosthetic technicians. The results will also be used to identify specific topics for in-service and/or continuing education, and to provide guidance for educational program enhancement in regard to curriculum review and/or programmatic self-assessment.

THE SPECIFIC OBJECTIVES OF THE STUDY WERE TO:

- Conduct a comprehensive practice analysis of the disciplines of orthotic and prosthetic technicians by updating and validating the domains of practice, the specific tasks performed and the associated knowledge and skills required to perform each task
- Collect information describing demographic and professional characteristics of certified technicians
- Quantify time spent and tasks performed with regard to various orthotic and prosthetic devices
- Develop defensible test specifications for the disciplines of orthotic and prosthetic technicians in connection with the credentialing examinations for certified technicians

Task Force Selection

ABC selected a Practice Analysis Task Force (PATF) to undertake the major work involved in updating the delineation of practice. The PATF was selected to represent a wide range of key background characteristics, such as: certified technicians in orthotics, prosthetics and those certified as technicians in both disciplines, as well as those with additional ABC credentials; those closer to the point of certification and more experienced practitioners; individuals from different work settings and representing various geographic regions; those with previous experience in ABC practice analysis studies; those having held leadership positions in ABC, or having served in other capacities such as member of the exam committees; and individuals new to the practice analysis process.

ProExam completed the following steps in collaboration with the PATF:

- Pre-meeting data collection with PATF
- Conducted two meetings of the PATF
- Revised the delineation and more closely aligned it with that developed for other ABC credentialing programs
- Developed and conducted an online survey, the *Practice Analysis Survey of Orthotic and Prosthetic Technicians*. The survey comprised two versions, including alternate forms of Section 1, as described below:
  - Introduction: Including a description of the purpose of the survey and instructions for completing the survey
  - Screening Question: To determine if respondent had been practicing as an orthotic and/or prosthetic technician in the past 12 months
  - Routing question: Respondents selected the discipline from which they were responding to the survey. Dually-certified individuals selected either orthotics or prosthetics.
  - Section 1: Respondents were randomly routed to rate either Tasks or Knowledge and Skills
    + Tasks, including 34 tasks delineated in association with eight domains of practice (plus a question about missing tasks), or
    + Knowledge and Skills, including 54 knowledge and skills statements (plus a question about missing KSs)
  - Section 2: Domains, including eight domains of practice
  - Section 3: Respondents were routed to either the Orthotic or Prosthetic Practice Area

and Device Lists, depending on their response to the routing question at the beginning of the survey. All respondents then answered questions about work activities related to both disciplines.

- Section 4: Open-ended questions regarding changes in practice.
- Section 5: Background Questionnaire, including questions about the respondent's educational and professional background, work setting and demographic characteristics.

Survey Return Rate

The overall response rate was 30%. This was derived by dividing the number of completed surveys by the number of valid invitations sent, defined as the number of invitations emailed minus those returned as undeliverable. One hundred-fifty certified technicians completed the survey. This is a very good response rate for a long and complex online survey such as the present study, and is comparable to response rates achieved in surveys of other professions. Respondents occasionally left questions blank, therefore the number of respondents may have been less than 150.

SECTION ONE

Results Related to Professional Background, Work Setting and Demographic Information

This section provides background information regarding the sample of ABC Certified Technicians. The survey included a questionnaire regarding professional history, work environment, educational background and demographic information.

As shown in Tables 1, 2 and 3, the overall sample responding to the survey was predominantly male, between 35 and 64 years old and White or Caucasian. This demographic picture of the sample is quite consistent with the certified technicians in the ABC database.

Comparatively, the 2009 survey indicated a female population of 9%, a mean age of 42 years and predominately of White or Caucasian ethnicity.

TABLE 1
Gender of Respondents

Female	7%
Male	90%
Prefer not to answer	3%
Total	100%

TABLE 2
Age of Respondents

Under 25	1%
25 to 34	16%
35 to 44	21%
45 to 54	39%
55 to 64	19%
65 or over	2%
Did not answer	2%
Total	100%

TABLE 3
Racial/Ethnic Background

American Indian or Alaska Native	<1%
Asian	2%
Black or African American	2%
Hispanic or Latino/Latina	2%
White or Caucasian	86%
More than one racial or ethnic background	1%
Other	2%
Prefer not to answer	5%
Total	100%

As shown in Table 4, more than half of the respondents indicated their highest level of education was high school or the equivalent and *either* O/P short-term courses or an O/P technician certificate. About 20% had an associate's degree and almost 15% had a bachelor's degree.

TABLE 4
Highest Educational Degree in any Discipline

HS/GED	12%
HS/GED and O/P short-term courses	8%
HS/GED and O/P technician certificate	43%
AA/AS	6%
AA/AS in O/P	14%
BA/BS	14%
Master's degree (MA, MS, MBA, etc.)	2%
Other	1%

As seen in Table 5, respondents were very experienced, with an average of nearly 20 years of technician experience for respondents from both disciplines.

TABLE 5
Years of Experience

Mean
19.6

Respondents worked across a range of settings, with the greatest proportion in a privately-owned, multi-facility orthotics and/or prosthetics practice (34%), followed by central fabrication facility (16%) then hospital or rehabilitation center (15%), as shown in Table 6.

TABLE 6
Primary Work Setting

Part of a multi-facility orthotics and/or prosthetics practice, publicly owned	15%
Part of a multi-facility orthotics and/or prosthetics practice, privately owned	34%
Single-location orthotics and/or prosthetics practice, privately owned	10%
Hospital or rehabilitation center	15%
University-based clinic or facility	4%
Academic or educational institution (teaching/research)	<1%
Central fabrication facility	16%
Other	6%
Total	100%

As shown in Table 7, the great majority of respondents (82%) were employees. Those writing in *Other* responses were generally managers.

TABLE 7
Primary Position

Employee of single location orthotics and/or prosthetics practice	25%
Employee of a multi-facility orthotics and/or prosthetics practice	50%
Employee of fabrication company	7%
Owner of fabrication company	8%
Other	10%
Total	100%

Tables 8 and 9 show the percentage of work time respondents spent in various roles. As can be seen, both orthotic and prosthetic respondents indicated they spent the majority of their work time in the fabrication role for their respective disciplines (63% of time for orthotics respondents and 57% of time for prosthetic); it can also be seen that both orthotic and prosthetic respondents also spent some work time in the fabrication role in the other discipline. Respondents also spent just under 10% of their work time in the clinical patient care role, either under supervision or unsupervised. Respondents spent about 12% to 14% of their time in an administrative role, and very little time (3%) in a patient education role.

TABLE 8
Percentage of Work Time – Orthotic Perspective

Orthotic fabrication	63%
Clinical orthotic patient care under direct supervision	3%
Clinical orthotic patient care, unsupervised	4%
Prosthetic fabrication	9%
Clinical prosthetic patient care under direct supervision	1%
Clinical prosthetic patient care, unsupervised	<1%
Patient education	3%
Administration/office management/inventory and supply management	14%
Other	3%
Total	100%

TABLE 9
Percentage of Work Time – Prosthetic Perspective

Prosthetic fabrication	57%
Clinical prosthetic patient care under direct supervision	4%
Clinical prosthetic patient care, unsupervised	3%
Orthotic fabrication	17%
Clinical orthotic patient care under direct supervision	1%
Clinical orthotic patient care, unsupervised	2%
Patient education	3%
Administration/office management/inventory and supply management	12%
Other	1%
Total	100%

Respondents typically worked in locations with one to five other technicians, as shown in Table 10.

TABLE 10
Number of Technicians at Primary Work Setting

1-5	71%
6-10	17%
11-15	9%
16 or more	3%
Total	100%

Most respondents (56%) worked in locations with one to five practitioners, as shown in Table 11, although about 10% worked in locations with no practitioners.

TABLE 11
Number of Practitioners at Primary Work Setting

0	10%
1-5	56%
6-10	18%
11-15	8%
16 or more	8%
Total	100%

A number of respondents held other ABC credentials, including certified assistants (COA, CPA and CPOA), fitters (CFo, CFm, CFom and CFts), and practitioners (CO, CP and CPO).

TABLE 12
ABC Credential(s) Held by Respondents
Multiple responses permitted. Totals do not sum to 100%.

Certified Technician-Orthotic (CTO)	26%
Certified Technician-Prosthetic (CTP)	43%
Certified Technician-Prosthetic Orthotic (CTPO)	31%
Certified Orthotic Assistant (COA)	5%
Certified Prosthetic Assistant (CPA)	16%
Certified Prosthetic Orthotic Assistant (CPOA)	5%
Certified Pedorthist (C.Ped.)	2%
Certified Orthotist (CO)	8%
Certified Prosthetist (CP)	1%
Certified Prosthetist-Orthotist (CPO)	3%
Certified Fitter-orthotics (CFo)	10%
Certified Fitter-mastectomy (CFm)	<1%
Certified Fitter-orthotics and mastectomy (CFom)	<1%
Certified Fitter-therapeutic shoes (CFts)	<1%

As can be seen in Table 13, more than 20% of orthoses and prostheses incorporated CAD/CAM, with a slightly higher percentage of prosthetic respondents than orthotic respondents indicating they incorporated CAD/CAM in fabrication.

TABLE 13
Percentage of Orthoses/Prostheses Fabricated Using CAD/CAM

Orthotics	Prosthetics	Mean
21%	24%	23%

The percentage of orthoses and prostheses fabricated onsite versus at a central fabrication facility is shown in Tables 14 and 15. As can be seen, a higher percentage of prostheses were fabricated onsite than were orthoses (87% versus 72%, respectively).

TABLE 14
Percentage of Orthotic Devices Fabricated Onsite or at a Central Fabrication Facility

Onsite	72%
Central Fabrication	23%
Not Applicable	5%

TABLE 15
Percentage of Prosthetic Devices Fabricated Onsite or at a Central Fabrication Facility

Onsite	87%
Central Fabrication	10%
Not Applicable	3%

SECTION TWO

Results Related to Domains, Tasks and Knowledge and Skill Statements

Domains omains are global areas of responsibility performed by credentialed professionals; in the current delineation the domains were identified as Initiation of Treatment Plan; Biomechanics; Implementation of Treatment Plan; Materials, Componentry and Design; Fabrication; Follow-up; Facility Management and Professional Responsibility.

Tasks are the activities performed within a domain of practice.

Knowledge and Skill Statements describe the organized body of information and the physical or mental manipulation of information or things required to perform the tasks associated with each domain.

Domain Ratings

This section presents the results of the ratings related to the eight domains delineated in the survey. Respondents to the survey rated each of the domains on two ratings scales:

- *% of Time*: Overall, what percentage of your work time did you spend performing the tasks related to each domain during the past year?
- *Criticality*: How critical is this domain to optimizing outcomes for patients, caregivers and healthcare providers?

Table 16 presents the results of the percentage of time and criticality ratings. As can be seen, respondents spent the majority of their technician work in the Fabrication domain regardless of their perspective (52% for the total sample), followed by Materials, Componentry and Design (15% for the total sample). The other six specifically delineated domains each accounted for less than 10% of technician work time. Respondents wrote in time spent in Other domains, which accounted for only slightly more than 1% of work time and largely focused on inventory, purchasing and customer contacts.

The mean Criticality rating for the two domains in which they spend much of their time indicates that these domains are between moderately and highly critical.

Overall, this table provides a profile of practice for orthotic and prosthetic technicians. They can be used to describe the profession to individuals in related healthcare professions and to the public. The profiles of practice can be used by academic programs as a means of assessing curricular offerings and/or program requirements. Similarly, the profiles of practice can be

used by providers of in-service education to plan course offerings, including entry-level and/or advanced-level workshops. Finally, the profiles of practice can be used by supervisors and/or employers in order to develop job descriptions and/or performance evaluation forms.

TABLE 16
Descriptive Statistics for Domains Percentage of Time and Criticality

	Percentage of Time[1]	Criticality[2]
Domain 1– Initiation of Treatment Plan: Review patient information to determine the technical requirements for the orthotic/prosthetic intervention and consult with the treating clinician, as needed, to confirm treatment objectives	3%	2.1
Domain 2–Biomechanics: Verify that the static alignment of the orthosis/prosthesis is appropriate and confirm that the orthosis/prosthesis functions as required	5%	2.4
Domain 3–Implementation of the Treatment Plan: Assist clinician, based on work setting, in obtaining model, measurements or scan, review assessment of fit of orthosis/prosthesis, make necessary adjustments or modifications to accomplish treatment goals	4%	2.2
Domain 4–Materials, Componentry and Design: Determine orthosis/prosthesis design requirements and verify that materials, componentry and design are consistent with established treatment plan including confirmation of structural integrity of device	15%	3.5
Domain 5–Fabrication: Consult with clinician about fabrication requirements and perform modifications of model/image, fabricate/assemble orthosis/prosthesis, assure device meets manufacturers' guidelines and document fabrication process	52%	3.9
Domain 6–Follow-Up: Make modifications, adjustments or repairs of orthosis/prosthesis, as directed by the treating clinician	4%	2.4

1 Overall, what percentage of your work time did you spend performing the tasks related to each domain during the past year?
2 How critical is this domain to optimizing outcomes for patients, caregivers and healthcare providers?
1=Not critical, 2=Minimally critical, 3=Moderately critical and 4=Highly critical

TABLE 16 cont.
Descriptive Statistics for Domains Percentage of Time and Criticality

	Percentage of Time[1]	Criticality[2]
Domain 7 – Facility Management: Maintain a safe and professional work environment including performing and documenting machine and equipment maintenance and calibration	8%	2.8
Domain 8 – Professional Responsibility: Follow patient care guidelines and procedures, adhere to applicable laws and regulations and participate in continuing professional development	1%	3.2
Other	1%	2.3

1 Overall, what percentage of your work time did you spend performing the tasks related to each domain during the past year?
2 How critical is this domain to optimizing outcomes for patients, caregivers and healthcare providers?
1=Not critical, 2=Minimally critical, 3=Moderately critical and 4=Highly critical

Task Ratings

All survey respondents rated the tasks on two rating scales:

- **Frequency:** How frequently did you independently (without supervision) perform the task during the past year? 1=Never/rarely, 2=Occasionally, 3=Frequently, 4=Very frequently
- **Criticality:** How critical is the task to optimizing outcomes for patients, caregivers and healthcare providers? 1=Never/rarely, 2=Occasionally, 3=Frequently, 4=Very frequently

Table 17 displays the mean of the Frequency and Criticality ratings for the task statements.

Four of the 34 tasks achieved a mean frequency rating of 4.8 (frequently to very frequently performed):

- Fabricate/assemble an orthosis and/or prosthesis to prepare for initial or diagnostic fitting and/or delivery
- Assess device for structural safety and ensure that manufacturers' guidelines have been followed prior to patient fitting/delivery (e.g., torque values, patient weight limits, manufacturers' guidelines)
- Adhere to applicable local, state and federal laws and regulations (e.g., OSHA, FDA)
- Follow patient care guidelines and procedures (e.g., ABC's Code of Professional Responsibility, ABC Orthotic, Prosthetic and Pedorthic Scope of Practice, quality control programs, ABC Facility Accreditation Standards)

One task had a frequency of 2.3 (rarely performed):

- Develop and document long-term service plan

In general, tasks were rated highly on the 4-point criticality scale regardless of discipline, with 28 of 34 tasks achieving a mean criticality rating of at least 3.0, indicating they are moderately to highly critical to optimizing outcomes. Of these, 20 achieved criticality ratings of 3.5 or higher, indicating they are close to highly critical. The two highest-rated tasks on the criticality scale both had mean ratings of 3.9 and were:

- Evaluate orthosis and/or prosthesis for structural integrity (e.g., are the materials used in the fabrication appropriate in regards to characteristics and properties)
- Assess device for structural safety and ensure that manufacturers' guidelines have been followed prior to patient fitting/delivery (e.g., torque values, patient weight limits, manufacturers' guidelines)

There were six tasks with mean criticality ratings below 3.0, and only one of these had a mean rating lower than 2.5. This task was also rated lowest on the frequency scale:

- Develop and document long-term service plan

TABLE 17
Task Frequency and Criticality Ratings

	Mean Frequency	Mean Criticality
Domain 1 – Initiation of Treatment Plan		
Review physical assessment data provided by practitioner (e.g., height, weight, activity level, amputation level, diagnoses, measurements, prior orthosis/prosthesis usage) to determine technical requirements for the orthosis/prosthesis	4.3	3.6
Consult with practitioner(s)/clinician(s) to confirm physical assessment data obtained (e.g., patient's condition/diagnosis, measurements, work order)	4.1	3.5
Participate in the education of patient and/or caregiver about the use and maintenance of the orthosis/prosthesis (e.g., donning and doffing, wearing schedules, other instructions, cleaning, lubrication)	2.5	2.6
Document technical treatment plan (including work order, layups, componentry, serial numbers) using established record-keeping techniques	4.0	3.3
Domain 2 – Biomechanics		
Determine fabrication requirements/technical criteria (e.g., static alignment of orthoses or prostheses)	4.6	3.7
Verify function of orthosis and/or prosthesis (e.g., does it perform as required in all planes of motion)	4.5	3.6
Domain 3 – Implementation of the Treatment Plan		
Review range of motion requirements (e.g., varus/valgus, flexion, extension) of the individual to determine patient's orthotic/prosthetic technical needs	3.2	2.9
Participate in procedure to obtain patient model (e.g., identify anatomical landmarks, measure patient, take impression, delineate, scan)	2.4	2.7
Review assessment of fit of orthosis and/or prosthesis with regard to anatomical relationships to orthosis and/or prosthesis (e.g., trimlines, musculoskeletal anatomy, static/dynamic alignment) to make needed changes to initial treatment goals	2.8	2.9

Frequency: 1=Never/rarely, 2=Occasionally, 3=Frequently, 4=Very frequently
Criticality: 1=Not, 2=Minimally, 3=Moderately, 4=Highly

	Mean Frequency	Mean Criticality
Domain 4 – Materials, Componentry and Design		
Evaluate orthosis and/or prosthesis for structural integrity (e.g., are the materials used in the fabrication appropriate in regards to characteristics and properties)	4.7	3.9
Adhere to manufacturer's conditions of use and/or specifications (e.g., identification of the need for repairs or replacement, warranties)	4.6	3.7
Consult with manufacturing professionals, as required (e.g., regarding componentry, design limitations, new materials)	3.5	3.2
Align orthosis and/or prosthesis for accuracy in sagittal, transverse and coronal planes in order to provide maximum function prior to initial fitting	4.4	3.6
Participate in the assessment to determine an orthotic/prosthetic treatment plan (e.g., orthosis/prosthesis design such as solid ankle versus posterior leaf spring [PLS], patella tendon bearing [PTB] versus total surface bearing)	2.7	2.6
Identify materials and components to support treatment plan	4.3	3.5
Determine orthosis/prosthesis design requirements (e.g., structural requirements, device specific functional requirements)	3.9	3.3
Verify that materials, design and components are provided as specified in the treatment plan	4.6	3.7
Select materials/techniques necessary to create a positive patient mold (e.g., fiberglass, plaster, scan)	3.4	3.0
Domain 5 – Fabrication		
Consult with practitioners regarding fabrication requirements	4.4	3.7
Modify patient model/image for fabrication	3.6	3.1
Fabricate/assemble an orthosis and/or prosthesis to prepare for initial or diagnostic fitting and/or delivery	4.8	3.8
Complete fabrication process after optimal fit and function of orthosis and/or prosthesis is achieved (e.g., convert test socket to definitive orthosis and/or prosthesis)	4.7	3.8
Assess device for structural safety and ensure that manufacturers' guidelines have been followed prior to patient fitting/delivery (e.g., torque values, patient weight limits, manufacturers' guidelines)	4.8	3.9
Verify and document final fabrication process (e.g., lamination materials, plastic thickness) using established record-keeping techniques	4.3	3.5

Frequency: 1=Never/rarely, 2=Occasionally, 3=Frequently, 4=Very frequently
Criticality: 1=Not, 2=Minimally, 3=Moderately, 4=Highly

	Mean Frequency	Mean Criticality
Domain 6 – Follow-Up		
Modify/adjust orthosis and/or prosthesis, as necessary, to maintain optimal function	3.7	3.3
Repair orthosis and/or prosthesis, as necessary	4.1	3.6
Document modifications/adjustments/repairs	3.7	3.3
Develop and document long-term service plan	2.3	2.4
Domain 7 – Facility Management		
Maintain a safe and professional environment (e.g., ABC Facility Accreditation Standards)	4.6	3.7
Perform scheduled machines and equipment maintenance and calibration	3.9	3.6
Document service of machines and equipment (e.g., maintenance logs)	3.4	3.2
Domain 8 – Professional Responsibility		
Adhere to applicable local, state and federal laws and regulations (e.g., OSHA, FDA)	4.8	3.8
Follow patient care guidelines and procedures (e.g., ABC Code of Professional Responsibility, ABC Orthotic, Prosthetic and Pedorthic Scope of Practice, quality control programs, ABC Facility Accreditation Standards)	4.8	3.8
Participate in continuing professional development and/or provide such education to other healthcare provide	4.0	3.5

Frequency: 1=Never/rarely, 2=Occasionally, 3=Frequently, 4=Very frequently
Criticality: 1=Not, 2=Minimally, 3=Moderately, 4=Highly

In summary, the overall pattern of the Frequency and Criticality ratings on these task statements indicates that the practice analysis delineation included critical tasks performed by technicians in both disciplines. The pattern of Frequency and Criticality ratings validates the use of these tasks in initiatives related to item writing and examination development.

Knowledge and Skills Ratings

The results in this section document the quantitative ratings of the respondents on the knowledge and skills statements delineated in association with each of the six domains. All survey respondents rated the knowledge and skill statements on two rating scales:

- **Criticality**—How critical is this knowledge or skill to optimizing outcomes for patients? The Criticality ratings for 34 of the 35 knowledge statements were rated minimally critical or higher on the criticality scale, of these 25 achieved a mean criticality of at least 3.0. All of the 19 skills achieved mean criticality ratings of 2.5 or higher, of these 15 achieved mean criticality ratings of at least 3.0.

- **Point of Acquisition**—At what point should this knowledge or skill be acquired by a Certified Technician?

The *Acquisition* rating scale is used to determine the point at which a knowledge or skill is required for practice. To the degree that respondents support *Acquisition primarily before passing the ABC examinations,* a body of knowledge or a skill may be considered as validated for inclusion in a credentialing program such as ABC's programs for Certified Technicians. For 45 of the 54 knowledge and skill statements, more than half of respondents indicated the knowledge or skill should be acquired *before* the point of certification.

Knowledge Statements

Knowledge of:

Musculoskeletal anatomy, including upper limb, lower limb, spinal

Anatomical landmarks (surface anatomy)

Normal human locomotion

Pathological gait

Tissue characteristics/management

Volumetric control

Planes of motion

Biomechanics

Pathologies (e.g., muscular, neurologic, skeletal, vascular)

Medical terminology

Procedures to record data

Policies and procedures regarding privileged information

Material safety procedures and standards (e.g., OSHA, MSDS)

Universal precautions, including sterile techniques and infection control

Ethical standards regarding proper patient management, including
ABC Code of Professional Responsibility
Scope of practice related to orthotic/prosthetic credentials
Boundaries of the scope of practice (i.e., when to refer a patient to other healthcare providers/caregivers)
Orthotic/prosthetic design (e.g., trimlines)
Orthotic/prosthetic fitting criteria
Impression-taking techniques, materials, devices and equipment
Rectification/modification procedures as they relate to specific orthotic/prosthetic designs
Measurement tools and techniques
Orthotic/prosthetic forms (e.g., assessment, orthometry, measurement, evaluation, outcomes)
Materials Science
Componentry
Alignment devices and techniques
Hand and power tools
Mechanics (e.g., levers and force systems)
Care and maintenance of orthoses/prostheses
Computer-aided design and manufacturing (CAD/CAM)
Item warranty and warranty limitations
Loss control (e.g., risk management, inventory control)
The psychology of the disabled
Federal and state rules, regulations, and guidelines (e.g., FDA, ADA, HIPAA)
ABC Facility Accreditation Standards

Skill Statements

Skill in:

Identifying gross surface anatomy
Interpretation of physical findings (e.g., recognizing skin pressures, dermatological conditions)
Interpretation of orthotic/prosthetic gait/motion
Impression-taking/measuring for orthoses/prostheses
Using mechanical measuring devices
Using computer-based measuring devices
Patient model modification
Delineating a tracing
Orthotic/prosthetic fabrication

Use of safety equipment
Skill Statements
Using hand and power tools
Use of materials and components
Use of alignment devices
Aesthetic finishing
Evaluating function of an orthosis/prosthesis
Adjusting and modifying orthoses/prostheses
Maintaining and repairing orthoses/prostheses
Restoring optimal function of orthoses/prostheses
Documenting

SECTION THREE

Results Related to Practice Areas and Devices

All survey respondents were asked to characterize the nature of their work in regard to an extensive list of orthotic or prosthetic devices, as appropriate. Dually certified respondents were asked to complete the task for the one discipline in which they spend the most time.

The results of these rating activities should be reviewed very carefully, as they provide guidance with regard to the development and/or refinement of ABC's certification exams. The results also provide guidance to the National Commission on Orthotic and Prosthetic Education (NCOPE) in the development of orthotic and prosthetic education standards.

Orthotic Practice Areas and Devices

As shown in Figure 2, those respondents who participated in the prosthetic version of the survey spent almost half their time (47%), on average, in transtibial practice, followed by transfemoral (30%) and Symes (8%).

FIGURE 1
Percentage of Time in Orthotic Practice Areas

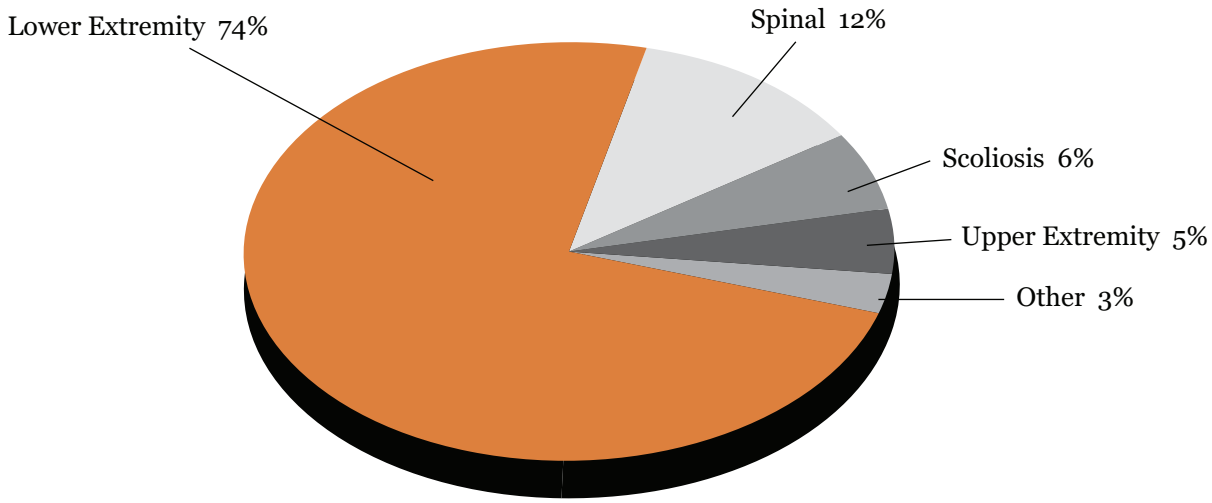


Table 18 provides details about the percentage of time spent with regard to specific orthotic devices. Within lower extremity, AFOs totaled 36% of time and KAFOs totaled 14.6% of time.

TABLE 18
Percent of Time in Orthotic Practice Areas and Devices

Lower Extremity	**74.2%**
Shoe modifications	6.1%
FO	7.3%
SMO (supra malleolar orthosis)	4.2%
AFO (leather gauntlet)	3.3%
AFO (metal)	4.7%
AFO (plastic)	26.2%
AFO (composite)	1.8%
KO	2.4%
KAFO (metal)	3.9%
KAFO (plastic)	8.4%
KAFO (composite)	1.0%
KAFO (stance control)	1.3%
HO	0.6%
HKAFO	1.9%
Other	1.1%
Spinal	**11.8%**
LSO (metal)	0.2%
LSO (thermoplastic)	3.1%
TLSO (metal)	0.6%
TLSO (thermoplastic)	5.9%
CTO	0.6%
CO	0.5%
Other	0.9%
Scoliosis	**5.9%**
TLSO	4.9%
CTLSO (Milwaukee)	0.5%
Other – “All go to central fabrication”	0.5%
Upper Extremity	**5.3%**
HO	0.3%
WHO	2.7%
EWHO	0.8%
EO	1.1%
Other	0.4%

TABLE 18 cont.
Detailed Percentage of Time in Each Area

Other	**2.8%**
Dynamic contracture orthosis	1.6%
Protective face mask	0.4%
Cranial molding orthosis	0.8%

Respondents indicated if they performed a number of activities with respect to specific orthotic devices at any time during the past year; results are shown in Table 19.

TABLE 19
Percentage Performing Each Activity with Respect to Orthotic Devices During Past 12 Months

	Perform Initial Patient Evaluation	Measure/ mold/ trace/ digitize/ scan	Modify model/ image/ tracing	Fabricate	Fit Patient	Re-evaluate patient	Modify/ repair/ replace
Lower Extremity							
Shoe modifications	12%	12%	31%	71%	17%	10%	10%
FO	12%	24%	49%	81%	15%	8%	54%
SMO (supra malleolar orthosis)	8%	12%	46%	73%	12%	7%	49%
AFO (leather gauntlet)	8%	8%	29%	42%	10%	7%	39%
AFO (metal)	7%	10%	46%	75%	5%	3%	46%
AFO (plastic)	8%	22%	58%	88%	14%	7%	59%
AFO (composite)	7%	8%	20%	41%	7%	5%	34%
KO	10%	15%	32%	54%	12%	8%	41%
KAFO (metal)	5%	12%	37%	66%	7%	5%	46%
KAFO (plastic)	8%	19%	49%	81%	10%	7%	61%
KAFO (composite)	5%	5%	19%	37%	5%	3%	29%
KAFO (Stance control)	3%	5%	20%	37%	3%	2%	31%
HO	7%	7%	24%	34%	7%	7%	31%
HKAFO	5%	10%	29%	51%	7%	5%	37%
Spinal							
LSO (metal)	3%	3%	12%	17%	3%	3%	15%
LSO (thermoplastic)	10%	10%	32%	53%	12%	8%	42%

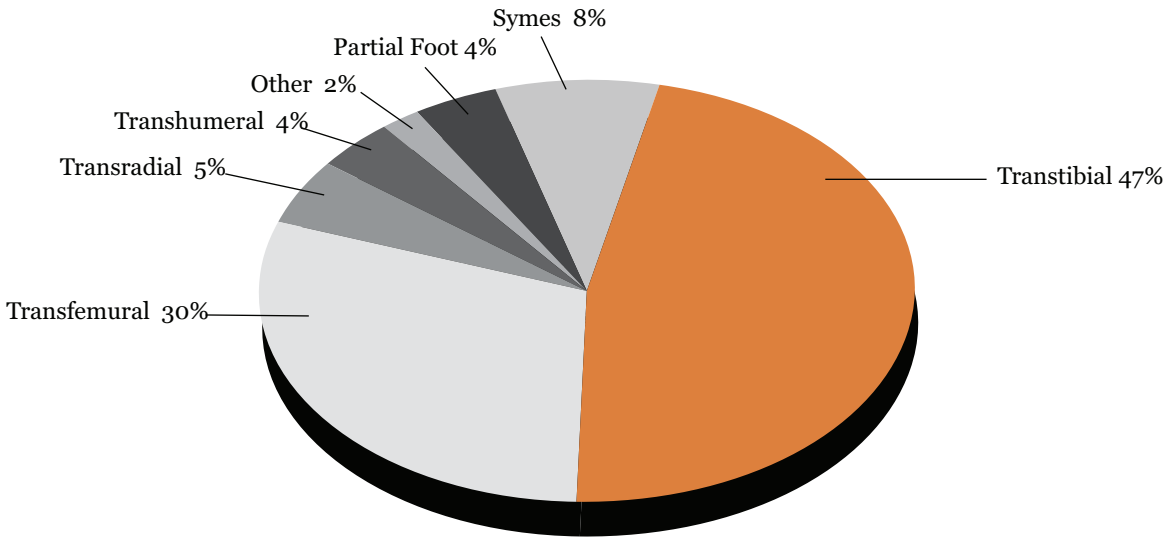
TABLE 19 cont.
Percentage Performing Each Activity with Respect to Orthotic Devices During Past 12 Months

	Perform Initial Patient Evaluation	Measure/ mold/ trace/ digitize/ scan	Modify model/ image/ tracing	Fabricate	Fit Patient	Re-evaluate patient	Modify/ repair/ replace
TLSO (metal)	5%	5%	17%	22%	5%	3%	19%
TLSO (thermoplastic)	10%	15%	36%	59%	10%	7%	47%
CTO	8%	10%	14%	19%	10%	7%	27%
CO	7%	5%	10%	17%	7%	5%	19%
Scoliosis							
TLSO	8%	15%	22%	44%	10%	7%	42%
CTLSO (Milwaukee)	5%	7%	7%	17%	8%	5%	17%
Upper Extremity							
HO	5%	8%	27%	37%	8%	5%	31%
WHO	7%	14%	36%	59%	8%	5%	42%
EWHO	5%	10%	27%	46%	8%	3%	36%
EO	7%	10%	29%	46%	8%	5%	36%
Other							
Dynamic contracture orthosis	7%	5%	8%	20%	7%	3%	19%
Protective face mask	0%	3%	12%	27%	0%	0%	20%
Cranial molding orthosis	2%	5%	5%	10%	2%	2%	10%

Prosthetic Practice Areas and Devices

As shown in Figure 2, those respondents who participated in the prosthetic version of the survey spent almost half their time (47%), on average, in transtibial practice, followed by transfemoral (30%) and Symes (8%).

FIGURE 2
Percentage of Time in Prosthetic Practice Areas



As seen in Table 20, within the transtibial area endoskeletal and laminated devices were most common, while in the transfemoral area, endoskeletal and combination devices (flexible inner socket, rigid frame) were most common.

TABLE 20
Percentage of Time in Prosthetic Practice Areas and Devices

Partial foot	**3.8%**
Silicone	0.8%
Leather	0.3%
Composite	1.6%
Thermoplastic	1.1%
Symes	**7.6%**
Expandable wall	0.5%
Removable window	2.7%
Removable insert or liner	4.4%
Transtibial	**47%**
Exoskeletal	4.6%
Endoskeletal	18.9%
Thermoplastic	2.8%
Laminated	11.6%
Combination (flexible inner socket, rigid frame)	9.1%
Transfemoral	**30.5%**
Exoskeletal	2.1%
Endoskeletal	12.5%
Thermoplastic	1.3%
Laminated	4.2%
Combination (flexible inner socket, rigid frame)	9.0%
Knee disarticulation	0.7%
Hip disarticulation	0.7%
Transradial	**5.3%**
Myoelectric	1.7%
Body-powered	3.6%
Transhumeral	**4.1%**
Myoelectric	0.6%
Body-powered	2.3%
Hybrid (body-powered elbow, myoelectric hand)	0.5%
Shoulder disarticulation	0.7%
Other (e.g. PFFD, Rotationplasty)	**1.7%**

Respondents indicated if they performed a number of activities with respect to specific prosthetic devices at any time during the past year; results are shown in Table 21.

TABLE 21
Percentage Performing Each Activity with Respect to Prosthetic Devices During Past 12 Months

	Perform Initial Patient Evaluation	Measure/ mold/ trace/ digitize/ scan	Modify model/ image/ tracing	Fabricate	Fit Patient	Re-evaluate patient	Modify/ repair/ replace
Symes	7%	13%	25%	86%	13%	10%	65%
Transtibial	13%	23%	47%	98%	22%	21%	78%
Van Ness rotationplasty	3%	4%	11%	32%	4%	4%	25%
Knee disarticulation	5%	13%	13%	84%	10%	13%	59%
Transfemoral	13%	21%	38%	98%	22%	19%	75%
Hip disarticulation or hemipelvectomy	7%	8%	16%	60%	9%	10%	47%
Partial hand	3%	3%	10%	35%	4%	7%	30%
Wrist disarticulation	4%	7%	14%	48%	5%	7%	38%
Transradial	7%	12%	25%	76%	11%	13%	59%
Transhumeral or elbow disarticulation	3%	7%	18%	63%	8%	11%	47%
Shoulder disarticulation	3%	3%	9%	31%	5%	7%	26%
Congenital limb deficiency	7%	9%	19%	56%	10%	10%	42%

Highlights Related to Professional Background, Work Setting and Demographic Information

- More than half of respondents (60%) answered from the perspective of a prosthetic technician and 40% answered from the perspective of an orthotic technician.

- Respondents came from 42 different jurisdictions, and were predominantly White or Caucasian (86%) and male (90%).

- The most frequent educational level of respondents was high school/GED with O/P technician certificate (43%), followed by an associates' degree (20%), a bachelor's degree (14%), high school (12%) and high school/GED and O/P short-term courses (8%).
- Respondents had an average of 19.6 years of technician experience.

- Almost one third (34%) of respondents' primary work settings were in a privately owned multi-facility orthotics or prosthetics practice, while 15% were in a hospitalbased practice. Nearly 10% were in a privately owned single practice and about 15% were in a publically owned multi-facility practice.

- Seventy-five percent of respondents were employees of a single or multi-facility practice; about 8% were fabrication company owners; and another 7% were employees of a fabrication company.

- Of respondents answering from the orthotic perspective, two thirds (63%) of time is spent in orthotic fabrication, 9% in prosthetic fabrication and 9% doing some type of clinical patient care.

- Of respondents answering from the prosthetic perspective, slightly less than two thirds of time (57%) is spent in prosthetics fabrication, 17% of time is spent in orthotic fabrication and 10% of time is spent doing some type of clinical patient care (either with supervision or unsupervised).

- Seventy-one percent of respondents worked in a facility with 1-5 other technicians, and an additional 17% worked in a facility with 6-10 other technicians. Fifty-six percent worked in a facility with 1-5 practitioners, and an additional 18% worked with 6-10 practitioners.

Highlights Related to Domains, Tasks, Knowledge and Skill Statements

- Technicians indicated that they spend the most time performing tasks associated with the Fabrication Domain (52%), followed by *Materials, Componentry and Design* (15%).

- The domains *Fabrication* and *Materials, Componentry and Design* are rated as at least moderately critical (3.9 and 3.5 respectively).

- Task frequency ratings range from a low of 2.3 (rarely performed) for Develop and document long-term service plan to a high of 4.8 (frequently to very frequently performed) for four tasks: *Fabricate/assemble an orthosis and/or prosthesis to prepare for initial or diagnostic fitting and/or delivery; Assess device for structural safety and ensure that manufacturers' guidelines have been followed prior to patient fitting/delivery (e.g., torque values, patient weight limits, manufacturers' guidelines); Adhere to applicable local, state and federal laws and regulations (e.g., OSHA, FDA); and Follow patient care guidelines and procedures (e.g., ABC Code of Professional Responsibility, ABC Orthotic, Prosthetic and Pedorthic Scope of Practice, quality control programs, ABC Facility Accreditation Standards).*

- Task criticality ratings are likewise lowest for *Develop and document long-term service plan* (2.4, minimally critical) but are at least 2.6 (minimally to moderately critical) for all other tasks.

- Knowledge statement criticality ranges from a high of 3.8 (moderately to highly critical) for *Anatomical landmarks* and *Hand/power tools* to a low of 2.3 (minimally critical) for *Psychology of the disabled.*

- Skill statement criticality ranges from a high of 3.9 (moderately to highly critical) for *Use of safety equipment* to a low of 2.5 (minimally critical) for *Interpretation of physical findings* and *Using computer-based measuring devices.*

- The overall pattern of the *Frequency* and *Criticality* ratings on the tasks, knowledge and skills indicates that the practice analysis delineation included the critical components used by orthotic and prosthetic technicians in practice. The pattern of *Frequency* and *Criticality* ratings validates the use of these tasks in initiatives related to examination development.

Highlights Related to Orthotic and Prosthetic Practice Areas and Devices

- Technicians working in the orthotic profession spend the majority of their work time (74%) working in the Lower Extremity practice area. The majority of this time is spent with AFO devices (36%). The Spinal area consumes the next largest percent of time (12%) followed by Scoliosis (6%) and Upper Extremity (5%).

- Orthotic technicians performed six listed activities at different rates depending on the practice area. Overall, Fabricate was performed most frequently, followed by Modify/ repair/replace.

- Technicians working in the prosthetic profession spend the majority of their work time (47%) in the Transtibial area, followed by Transfemoral (30%), Symes (8%).

- Prosthetic technicians performed the six activities at different rates depending on the practice area. Overall, Fabricate was performed most frequently, followed by Modify/ repair/replace.