APTA SPECIALIST CERTIFICATION

Cardiovascular and Pulmonary Physical Therapy
Description of Specialty Practice

Specialty Council on Clinical Electrophysiologic Physical Therapy
American Board of Physical Therapy Specialties
Acknowledgements

The Cardiovascular and Pulmonary Physical Therapy Description of Specialty Practice was prepared by the members of a subject matter expert (SME) group and approved by the American Board of Physical Therapy Specialties of the American Physical Therapy Association.

Subject Matter Experts

Angela Abeyta Campbell, PT, DPT  
Ethel M. Frese, PT, DPT, FAPTA  
Sean T. Lowers, PT, DPT  
Joe F. Norman, PT, PhD  
Dawn M. Stackowicz, PT, DPT, MS  
Julie A. Starr, PT, DPT  
Matthew M. Walko, PT, DPT

Project Coordinator and SME Group Member

Jeffrey S. Rodrigues, PT, DPT

Consultant

Jean Bryan Coe, PT, DPT, PhD

Throughout this document, the editors have attempted to use language consistent with the Guide to Physical Therapist Practice and universally accepted concepts and terminology, without bias to any particular philosophy or school of thought. The references cited with the case scenarios are given only to help the reader understand the specific examples and are not intended to favor any particular school of thought or philosophy. In addition, these references are not intended to be inclusive.

The Specialty Council on Cardiovascular and Pulmonary Physical Therapy encourages your suggestions for improvement of this document. Your input and suggestions will be considered in the development of the next revision. This is a working document and will be modified as necessary.

American Board of Physical Therapy Specialties

Specialty Council on Cardiovascular and Pulmonary Physical Therapy

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Introduction

History of Specialization in Physical Therapy

In 1975, the House of Delegates of the American Physical Therapy Association approved the concept of specialization and created the Task Force on Clinical Specialization. The task force was charged with identifying and defining physical therapy specialty practice areas and with developing the structure for and function of a board-certified process. Specialist certification was established to provide formal recognition for physical therapists with advanced clinical knowledge, experience, and skills in a defined area of practice. Certification is achieved through the successful completion of a standardized application and examination process.

The document developed by the task force, Essentials for Certification of Advanced Clinical Competence in Physical Therapy, was adopted by the House in 1978. At that time, the House recognized four specialty areas: cardiopulmonary, neurology, orthopaedics, and pediatrics. In 1979, the House appointed the Commission for the Certification of Advanced Clinical Competence. Specialty councils for each of the four specialty areas were appointed and charged with the development of competencies unique to each area of advanced clinical practice.

In 1980, the commission became the Board of Certification of Advanced Clinical Competencies. The House recognized two additional specialty areas in the same year: sports and clinical electrophysiology. In 1985, the House revised Essentials for Certification of Advanced Clinical Competence in Physical Therapy, and the name was changed to Essentials for Certification of Physical Therapist Specialists. The BCACC was renamed the American Board of Physical Therapy Specialties, and the first specialty examination was administered in cardiopulmonary physical therapy that same year. As of 2020, the 10 specialty areas are: cardiovascular and pulmonary, clinical electrophysiological, geriatric, neurology, oncologic, orthopaedic, pediatric, sports, women's health, and wound management physical therapy.

History of Specialization in Cardiovascular and Pulmonary Physical Therapy

Work on the specialization process in cardiovascular and pulmonary physical therapy began in 1976 at the APTA Combined Sections Meeting in St. Louis, Missouri. The first Cardiopulmonary Section chair, Scot Irwin, PT, MA (board-certified cardiovascular and pulmonary clinical specialist), led a group discussion concerning the concept of specialization and the specifics of advanced clinical competence in cardiovascular and pulmonary physical therapy. In 1979, Bob Huhn, PT, as Cardiovascular and Pulmonary Section chair, appointed Marcia Pearl, PT, and Sue Gibson, PT, cochairs of the competency committee. They enlisted the help of Pamela Catlin, PT, EdD, as a consultant and together created the format and much of the competency content printed in the first version of “Physical Therapy Advanced Clinical Competencies: Cardiopulmonary.”

Following minor revisions by the Cardiopulmonary Specialty Council in August 1983, BCACC gave approval to “Physical Therapy Advanced Clinical Competencies: Cardiopulmonary.” Contributors to the first edition included: Marilyn Anderson, PT; Linda Carroll, PT; Pamela Catlin, PT, EdD; Catherine Certo, PT; Linda Crane, PT, MMSc (board-certified cardiovascular and pulmonary clinical specialist); Jan Duttarar, PT; Donna Frownfelter, PT, MA (board-certified cardiovascular and pulmonary clinical specialist); Suzanne Gibson Bliss, PT; David Hoepfer, PT; Tom Holtackers, PT; Robert Huhn, PT; Scot Irwin; Colleen Kigin, PT, MS, MPA; Linda Oder Greaves, PT; Marcia Pearl, PT; Eileen Shepard Goldstein, PT; Jan Tecklin, PT; and Cynthia Zadai, PT, MS (board-certified cardiovascular and pulmonary clinical specialist).
The Cardiopulmonary Specialty Council was the first council to identify and define advanced skills, establish minimal criteria, and prepare a certification examination. In 1985, the first specialty examination was administered by ABPTS in the area of cardiopulmonary physical therapy. The first clinical specialists were Scot Irwin, PT, DPT; Linda Crane, PT, PhD, MMSc; and Meryl Cohen, PT, DPT, MS, FAPTA. In 1986, the council revised and validated the patient care competency, which subsequently was approved by ABPTS in 1987.

In 1994, the council performed a practice analysis. Section members were surveyed to validate existing competencies and identify new ones. The resulting “Description of Advanced Clinical Practice” was approved, with revisions, by ABPTS in 1996. Contributors to this second edition included: Rhonda Barr, PT, MA (board-certified cardiovascular and pulmonary clinical specialist); Lori A Buck, PT, MS (board-certified cardiovascular and pulmonary clinical specialist); Susan Butler, PT, MMSc (board-certified cardiovascular and pulmonary clinical specialist); Lawrence Cahalin, PT, MS (board-certified cardiovascular and pulmonary clinical specialist); William E. DeTurk, PT, PhD (board-certified cardiovascular and pulmonary clinical specialist); Laurita Hack, PT, DPT, PhD, MBA, FAPTA; Dianne Jewell, PT, MS (board-certified cardiovascular and pulmonary clinical specialist); and H. Steven Sadowsky, PT, MS (board-certified cardiovascular and pulmonary clinical specialist).

In 2005, the Cardiovascular and Pulmonary Specialty Council began the process of specialty practice revalidation for the second time. A project team was created to represent cardiovascular and pulmonary specialty practice across diverse ages, practice settings, geographic regions, and lengths of time as a specialist. This project team met to create a survey to validate the state of specialty practice in cardiovascular and pulmonary physical therapy. Both specialist and nonspecialist section members were surveyed and the results were analyzed to create the "Cardiovascular and Pulmonary Physical Therapy Description of Specialty Practice." This document was approved by ABPTS in 2007. Members of this project team included: Alexandra Sciaky, PT, MS (board-certified cardiovascular and pulmonary clinical specialist); Angela Abeyta Campbell, PT, DPT (board-certified cardiovascular and pulmonary clinical specialist); Anne K. Swisher, PT, PhD (board-certified cardiovascular and pulmonary clinical specialist); John D. Lowman, PT, PhD (board-certified cardiovascular and pulmonary clinical specialist); Anne Mejia Downs, PT, MPH, CCS; Kris Ishii, PT, MS (board-certified cardiovascular and pulmonary clinical specialist); Ana Lotshaw, PT, MS (board-certified cardiovascular and pulmonary clinical specialist); Susan Butler McNamara, PT, MMSc (board-certified cardiovascular and pulmonary clinical specialist); Heidi Hahn Tymkew, PT, DPT (board-certified cardiovascular and pulmonary clinical specialist); and Laurita M. Hack, PT, DPT, MBA, FAPTA.

In 2015, the council began the process of specialty practice revalidation for the second time. The project team consisted of board-certified cardiovascular and pulmonary clinical specialists representing a diverse mix of years in practice in the specialty area, practice settings, and geographical regions. The subject matter expert group met to create a survey to validate the current state of practice in the cardiovascular and pulmonary physical therapy specialty area. Both current board-certified cardiovascular and pulmonary clinical specialists and nonspecialist members practicing in the cardiovascular and pulmonary areas completed the survey. The results were analyzed to create the “Description of Specialty Practice: Cardiovascular and Pulmonary Physical Therapy.” This document was approved by ABPTS in 2017. Members of the SME group included: Jeffrey S. Rodrigues, PT, DPT; Ethel M. Frese, PT, DPT, FAPTA; Angela Abeyta Campbell, PT, DPT; Joe Norman, PT, PhD; Sean T. Lowers, PT, DPT; Dawn M. Stackowicz, PT, DPT, MS; Julie A. Starr, PT, DPT; Matthew M. Walko, PT, DPT; and Jean Bryan Coe, PT, DPT, PhD.
Chapter 1: Description of Specialists in Cardiovascular and Pulmonary Physical Therapy

The following information is based on responses to the 2016–2017 practice analysis survey. The survey drew responses from 76 board-certified cardiovascular and pulmonary clinical specialists. Five of the respondents also were board certified in another specialty area: four in geriatrics and one in orthopaedics.

Figure 1. Cardiovascular and Pulmonary Clinical Residency Program Graduate

![Figure 1][1]

Figure 2. Total Number of Years as a Practicing Physical Therapist

![Figure 2][2]

<table>
<thead>
<tr>
<th>Experience Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 year</td>
<td>0%</td>
</tr>
<tr>
<td>1–2 years</td>
<td>0%</td>
</tr>
<tr>
<td>3–5 years</td>
<td>5%</td>
</tr>
<tr>
<td>6–10 years</td>
<td>24%</td>
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<tr>
<td>11–15 years</td>
<td>18%</td>
</tr>
<tr>
<td>16–20 years</td>
<td>12%</td>
</tr>
<tr>
<td>21–30 years</td>
<td>20%</td>
</tr>
<tr>
<td>&gt;30 years</td>
<td>20%</td>
</tr>
</tbody>
</table>

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[1]: Image of a pie chart showing the percentage of respondents who are graduates of a cardiovascular and pulmonary clinical residency program (14%) and those who are not (86%).
[2]: Image of a bar chart showing the distribution of years as a practicing physical therapist. The distribution is as follows:
- <1 year: 0%
- 1–2 years: 0%
- 3–5 years: 5%
- 6–10 years: 24%
- 11–15 years: 18%
- 16–20 years: 12%
- 21–30 years: 20%
- >30 years: 20%
Figure 3. Evaluate and/or Treat Cardiovascular and/or Pulmonary Patients Without a Physician Referral

Yes
15%

No
85%

Figure 4. Factors Influencing Cardiovascular and Pulmonary Clinical Decision Making

- Published clinical practice guidelines: 14%
- Peer-reviewed evidence: 14%
- Patient preferences: 11%
- Entry-level physical therapy education: 10%
- Postprofessional physical therapy education: 11%
- Clinical experience (trial and error): 23%
- Continuing education short courses: 9%
- Residency/fellowship or mentoring experience: 9%
- Clinical outcomes data (e.g., comparing my patient outcomes with patient outcomes reported in the literature): 8%
Figure 5. Use of Standardized Cardiovascular and Pulmonary Outcome Measures

Top eight responses:
- 2- or 6-Minute Walk Test
- Gait speed test (e.g., 5- or 10-Meter Walk Test)
- Activity Measures for Post Acute Care (AM-PAC)
- St. George’s Respiratory Questionnaire
- UCSD Shortness of Breath Questionnaire
- Duke Activity Status Index (DASI)
- Scored Physical Function Intensive Care Test (PFIT-s)
- Short Physical Performance Battery (SPPB)

Figure 6. Mean Percentage of Time in Professional Activities

- Direct cardiovascular and pulmonary physical therapy patient/client management: 97%
- Direct patient/client management other than cardiovascular and pulmonary: 68%
- Consultation: 67%
- Administration/management: 71%
- Advocacy: 54%
- Clinical teaching: 79%
- Academic teaching: 89%
- Research: 76%
- Other: 25%
Figure 7. Current Practice Setting

- Acute care hospital: 85%
- Sub-acute rehab hospital (inpatient): 28%
- Health system or hospital based outpatient facility or clinic: 40%
- Private outpatient office or group practice: 24%
- SNF/ECF/ICF: 26%
- Patient’s home/home care: 25%
- School System (preschool/primary/secondary): 24%
- Academic Institution (post-secondary): 67%
- Health and Wellness Facility: 22%
- Research Center: 29%
- Industry: 22%
- Other: 19%

Figure 8. Current Employment Status

- Full-time salaried/hourly: 86%
- Part-time salaried/hourly: 11%
- Full-time self employed: 3%
- Part-time self employed: 0%
- Retired: 0%
- Unemployed (not retired): 0%
- Other: 0%
Figure 9. Education at Entry-Level Into the Profession

- Baccalaureate Degree: 27%
- Post-baccalaureate Certificate: 1%
- Master's Degree: 30%
- Doctorate of Physical Therapy Degree: 41%
- Other: 1%

Figure 10. Highest-Earned Academic Degree Beyond Entry-Level Physical Therapy Degree

- Advanced Master's in Physical Therapy: 8%
- Other Master's degree: 3%
- Post-professional DPT: 30%
- Other Doctoral Degree (PhD/EdD/DSc): 14%
- No degrees beyond entry level: 45%
Figure 11. Geographic Region of Practice

- **Northeast** — New England: 14%
- **Northeast** — Middle Atlantic: 15%
- **Midwest** — East North Central: 18%
- **Midwest** — West North Central: 14%
- **South** — South Atlantic: 23%
- **South** — East South Central: 4%
- **South** — West South Central: 9%
- **West** — Mountain: 3%
- **West** — Pacific: 1%
Figure 12. Sex*

Female 76%
Male 24%

Figure 13. Race/Ethnic Origin*

- African American: 1%
- Asian: 6%
- Hispanic/Latino: 2%
- White (non-Hispanic): 85%
- Other: 5%

Figure 14. Age by Generation*

- Traditionalists (born before 1945): 1%
- Baby Boomers (born 1946–1964): 24%
- Generation X (born 1965–1981): 53%
- Millennials (born 1982–2000): 21%

* Figures 12, 13, and 14 are not based on the survey data. Instead, they reflect data for all currently board-certified cardiovascular and pulmonary clinical specialists.
Chapter 2:  Description of Specialty Practice in Cardiovascular and Pulmonary Physical Therapy

The “Description of Specialty Practice in Cardiovascular and Pulmonary Physical Therapy” describes the practice of cardiovascular and pulmonary clinical specialists. It is based on the results of a 2016-2017 practice analysis survey that received responses from 87 specialist and nonspecialist Cardiovascular and Pulmonary Section members.

The content of the practice analysis survey was based on the patient or client management model of the Guide to Physical Therapist Practice (guidetoptpractice.apta.org) including the Patient/Client Management Model categories of examination, evaluation, diagnosis, prognosis, intervention, and outcomes. In addition, the professional roles, responsibilities, and values were based on APTA’s Professionalism in Physical Therapy: Core Values (now titled Core Values for the Physical Therapist and Physical Therapist Assistant, House of Delegates position P06-19-48-55) as well as the 2007 version of the “Description of Specialty Practice in Cardiovascular and Pulmonary Physical Therapy.”


The DSP represents specialty practice, which includes all elements of practice at entry to the profession. Only the elements considered to be specialty practice, either in frequency, importance or levels of judgment or mastery are included here.

I. Knowledge Areas of Cardiovascular and Pulmonary Clinical Specialists

A. Foundation Sciences
   1. Cardiovascular and pulmonary anatomy, including embryologic development.
   2. Physiology of cardiovascular, pulmonary, and related organ systems.
   3. Exercise physiology.
   5. Pathology/pathophysiology.

B. Behavioral Sciences
   1. Ethical and legal implications.
   2. Management and leadership sciences.
   3. Psychology and mental health.
   4. Sociology and social justice.
   5. Teaching and learning.

C. Clinical Sciences
   1. Cardiac, vascular, and thoracic surgery.
   2. Cardiovascular and pulmonary pathophysiology.
   3. Cardiovascular and pulmonary medicine (pediatric/adult/geriatric).
   4. Cardiovascular and pulmonary rehabilitation.
   5. Critical care medicine (including American Heart Association Advanced Cardiac Life Support, as allowed by state law).
   7. Exercise science.
8. Public health:
   a. Epidemiology and population health (e.g., risk factor assessment, socioeconomic and cultural disparities, genetics).
   b. Health promotion, wellness, and nutrition.
9. Technological advances in medicine:
   a. Artificial devices, regenerative medicine, telehealth, and other emerging advances.
   b. Imaging and interventional radiology.

D. Critical Inquiry Principles and Methods
1. Identifies appropriate cardiovascular and pulmonary physical therapy research questions.
2. Critically appraises current theory/literature supporting the identified problem.
3. Develops appropriate project design and methodology, including relevant statistical tools analysis.
4. Analyzes and interprets project findings and applies results to practice management.
5. Disseminates project results through presentations to peers, other health care professionals, and the public, as appropriate.
6. Mentors others in the collaborative investigation processes.
7. Engages in activities such as clinical research trials, treatment efficacy studies, quality assurance or utilization review projects, formal systematic reviews, and development of peer-reviewed clinical practice guidelines.

II. Professional Roles, Responsibilities, and Values of Cardiovascular and Pulmonary Clinical Specialists

A. Professional Behaviors
1. Pursues advanced knowledge, skills, and abilities through lifelong learning (e.g., residency and fellowship training, seminars, structured self-study, professional meetings, journal clubs, etc).
2. Uses patient-centered ethics and values in complex clinical decision making.
3. Devotes time and effort to resolve complex problems.
4. Demonstrates active membership and involvement in professional organizations related to cardiovascular and pulmonary practice.

B. Leadership
1. Facilitates conflict resolution.
2. Participates in activities beyond immediate scope of responsibility in order to expand, improve, or define the practice or awareness of cardiovascular and pulmonary physical therapy.
3. Seeks opportunities to mentor others.
4. Shapes system policies and procedures, selecting the most effective method to build consensus.
5. Serves as change agent specific to health behaviors.

C. Education, Theory and Practice
1. Advocates for involvement in formalized advanced credentialing and/or professional development opportunities, such as clinical residencies and fellowships.
2. Mentors physical therapists, physical therapist assistants, physical therapy students/residents/fellows, and other health care professionals by participating in clinical education and research related to cardiovascular and pulmonary physical therapy.
3. Provides evidence-based educational programs to a variety of audiences, including students, other health care professionals, the general public, political groups and candidates, and third-party payers.
D. Administration
1. Creates institutional intra- and interprofessional guidelines and competencies as an interdisciplinary team member.
2. Develops, implements, and evaluates the effects of policies and procedures on the cardiovascular and pulmonary physical therapist practice.
3. Resolves issues related to delivery of services, staff productivity, quality assurance, cost containment, and third-party reimbursement in cardiovascular and pulmonary physical therapist practice settings.

E. Consultation
1. Performs a needs assessment of individuals or private/public organizations, related to cardiovascular and pulmonary health disparity or wellness issues.
2. Provides expertise and/or second opinions regarding patient or client management to both intra- and interprofessional team members.
3. Performs peer review, including publications/manuscripts, chart reviews, performance reviews, or teaching evaluations.
4. Provides expert opinion to legal entities, corporations, third-party payers, and regulatory agencies.

F. Evidence-Based Clinical Practice
1. Identifies, synthesizes, and integrates current cardiovascular and pulmonary literature, including clinical practice guidelines, into clinical practice.
2. Evaluates the efficacy and effectiveness of new and established examination tools, interventions, and technologies, and integrates into cardiovascular and pulmonary clinical practice as appropriate.
3. Selects, collects, and interprets appropriate patient and practice management outcomes.
4. Self-reflects to further clinical mastery and expertise, based on outcomes data.

III. Patient and Client Management Expectations of Cardiovascular and Pulmonary Physical Therapists

A. Examination
1. History:
   a. Reviews and interprets the clinical significance for physical therapy of all available patient or client data, including but not limited to: general health status; physical examination findings and progress notes from other health care team members; cardiovascular/pulmonary clinical tests and diagnostic imaging studies; dynamic physiological monitoring (e.g., electrophysiological tracings, pulmonary artery pressures); and medical/surgical and pharmacologic interventions.
   b. Conducts an efficient, effective, and focused patient or client interview to anticipate and detect cardiovascular and/or pulmonary management issues by ascertaining current and previous symptoms, general health status, psychosocial considerations, environmental exposures, patient understanding of cardiovascular and pulmonary disease processes and impairments, risk factor information, vocational history, history and motivation for lifestyle change(s), and patient or caregiver goals.
2. Systems review:
   a. Selects and applies appropriate tools for screening the cardiovascular and pulmonary, musculoskeletal, neuromuscular, and integumentary systems.
   b. Recommends action(s) based on screening results. Possible actions include: retain as a client to benefit from PT services, refer/consult other providers, or no further intervention recommended.
3. Tests and measures:
   a. Selects and prioritizes appropriate tests and measures based on the results of initial history and systems review.
   b. Performs clinical tests and measures accurately, including:
      1) Aerobic capacity/endurance (e.g., maximal or submaximal tests, such as graded exercise tests, 6-Minute Walk Test, gait speed, etc).
      2) Collaboration in maximal symptom-limited exercise tests (e.g., VO2 max test with collaborate on additional tests, breath-by-breath analysis).
      3) Ventilatory muscle performance and endurance (e.g., inspiratory muscle trainers).
      4) Measurement of edema.
      5) Palpation (e.g., pulses, musculoskeletal, provocation testing).
      6) Circulation (e.g., arterial, venous, lymphatic):
         a) Abdominal-jugular reflex.
         b) Ankle brachial index.
         c) Auscultation of bruits.
         d) Auscultation of heart sounds.
         e) Electrocardiographic tracings (e.g., 12-lead).
         f) Jugular venous distension.
         g) Claudication pain.
         h) Dynamic physiologic response(s) to position change, activity/exercise (e.g., cardiac index).
4. Education, work, community, social, and civic life:
   a. Determines capacity to perform life roles (e.g., metabolic equivalent [MET] level), in order to navigate school/work environments, perform community ambulation, attend religious/spiritual services, etc.
   b. Determines environmental factors/barriers that impact patient or client endurance.
5. Joint integrity and mobility (e.g., chest wall excursion and rib mobility/intervertebral joint mobility).
6. Mental function:
   a. Observes/screens for symptoms of anxiety, depression, delirium, etc.
   b. Observes patient or client ability to learn and retain information.
7. Posture:
   a. Observes dynamic postural response to ventilatory demands.
   b. Self-care, domestic life:
   c. Performs critical care mobility tests (e.g., Activity Measure for Post-Acute Care [AM-PAC], Short Physical Performance Battery [SPPB]).
   d. Administers disease-specific questionnaires (e.g., Minnesota Living With Heart Failure Questionnaire, St. George’s Respiratory Questionnaire).
   e. Ventilation, respiration, and airway clearance:
      a. Performs pulmonary auscultation.
      b. Examines cough and ability to clear airways.
      g. Examines artificial airways.
      h. Evaluates breathing patterns and applies ventilation strategies.
      i. Examines mechanical ventilation settings.
      j. Performs spirometry and pulmonary function testing.
      k. Tissue oxygenation — fraction of inspired oxygen to peripheral oxygen saturation ratio (FiO2/SpO2).

B. Evaluation
1. Differentiates among functional and structural impairments, activity limitations, participation restrictions, environmental factors, and risk factors that require compensatory strategies versus intervention strategies, focusing on recovery of normal function.
2. Relates impairments, activity limitations, participation restrictions, and psychosocial factors to the patient’s or client’s and caregiver’s expressed goals.
3. Analyzes observed physiological responses to interventions, and adapts or terminates appropriately.
4. Develops an individual exercise prescription based on analysis of exercise test results.
5. Determines need for and titrate supportive devices during exercise (e.g., supplemental oxygen, Venturi mask).
6. Recommends specific interventions based on analysis of cardiovascular and/or pulmonary disease risk factors.
7. Responds to potentially life-threatening changes in physiologic status.
8. Integrates data from monitors, tests, screens, and evaluations used or performed by other health care professionals.
9. Determines appropriateness of delegation of aspects of patient or client management to other physical therapy providers (e.g., physical therapist assistants).
10. Determine needs of patient or client that indicate interprofessional referral (i.e., to other health care professionals).

C. Diagnosis
1. Analyzes examination data to develop a physical therapy differential diagnosis(es).
2. Differentiates among elements of ICF classification that are responsive to physical therapist intervention.
3. Refers patient or client to other professionals for findings that are outside the scope of the physical therapist’s knowledge, experience, or expertise.

D. Prognosis
1. Predicts optimal level of improvement in function, including time to achieve that level, with a high level of accuracy.

E. Plan of Care
1. Prioritizes interventions related to the severity, acuity, and chronicity of disease and comorbid conditions, patient or client goals and attributes, resources, and risk factors.
2. Determines aspects of patient and client management that may require ongoing or episodic services to ensure safety and effective adaptation based on lifespan and changes in physical function.

F. Intervention
1. Coordination, communication, and documentation:
   a. Consults and communicates interprofessionally regarding evidence-based justification of plan of care, critical and potentially life-threatening conditions, and changes in patient or client status to member(s) of the health care team in a timely and appropriate manner.
   b. Participates in and/or leads patient rounds, conferences, and team meetings, as appropriate for setting.
   c. Advocates for increased utilization of cardiovascular and pulmonary specialty services by referring practitioners.
   d. Collaborates with patients, families, care providers, organizations, and the public to implement programs or services for risk factor reduction and cardiovascular and pulmonary health and wellness.
2. Patient- or client-related education:
a. Educates patient or client about the plan of care, responsibility for health maintenance, and self-management in a patient-centric manner adjusted for health beliefs and level of learning.

b. Educates patients, clients, and caregivers in therapeutic interventions that integrate specialty techniques (e.g., airway clearance, suctioning, exercises) as part of the plan of care.

c. Educates patient or client in self-monitoring during therapeutic intervention and activities of daily living.

d. Educates patient or client in strategies to optimize activities and participation adjusted for disease state and severity, within available resources and support systems.

e. Adjusts patient or client education according to learner’s ability to independently demonstrate knowledge and perform skills.

3. Procedural interventions:

a. Implements and tailors interventions based on the patient’s or client’s anatomic and physiological changes according to acuity, chronicity, and lifespan development.

b. Negotiates barriers to interventions with the patient or client, including cognition, literacy, language, emotional state, socioeconomic status, and scarcity of resources, resulting in optimized adherence.

4. Specific intervention techniques:

a. Therapeutic exercise:
   1) Modifies exercise parameters based on physiologic monitoring.
   2) Trains peripheral skeletal muscles to optimize oxygen transport and central and peripheral endurance.
   3) Implements techniques to improve strength and/or endurance of ventilatory muscles and to develop breathing retraining strategies (e.g., inspiratory muscle training devices).
   4) Determines need for and titrates supportive devices during exercise (e.g., supplemental oxygen, Venturi mask).
   5) Exercises patients or clients with hemodynamic support/monitoring devices:
      a) Extracorporeal membrane oxygenation.
      b) Intra-aortic balloon pump.
      c) Mechanical circulatory devices (e.g., total heart, ventricular assist devices).
      d) Pulmonary artery catheters.
   6) Modifies exercise interventions based on pathologies and medical/surgical precautions (e.g., sternal stability and pursed-lipped breathing for dynamic hyperinflation).
   7) Exercises patients or clients with ventilatory support devices (e.g., invasive and noninvasive mechanical ventilator).

b. Functional training in self-care and domestic, education, work, community, social, and civic life:
   1) Optimizes endurance for patient or client activity and participation.
   2) Implements energy conservation techniques to optimize activity and participation performance.

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   1) Optimizes endurance for patient or client activity and participation.
   2) Implements energy conservation techniques to optimize activity and participation performance.

b. Functional training in self-care and domestic, education, work, community, social, and civic life:
   1) Optimizes endurance for patient or client activity and participation.
   2) Implements energy conservation techniques to optimize activity and participation performance.
d. Techniques to improve ventilation and respiration, including airway clearance techniques:
   1) Performs suctioning (via artificial airway, oral, nasotracheal, or tracheal).
   3) Provides manual ventilation during intervention.
   4) Performs assisted cough techniques — manual and mechanical.
   5) Manages mechanical airway clearance devices, such as high-frequency chest wall oscillators (e.g., Vest®), positive expiratory pressure (PEP) devices, and oscillating PEP (e.g., Acapella®, Flutter®, intrapulmonary percussive ventilation).
   6) Performs self-management of airway clearance techniques, such as autogenic drainage, active cycle of breathing, pursed-lipped breathing, and self-suctioning.

G. Outcomes:
   1. Assesses improvement of patient’s or client’s activities and participation based on best available evidence and patient- or client-specific variables (e.g., history, diagnosis, complications).
   2. Chooses appropriate assessment measures to determine initial and long-term responses to intervention.
   3. Utilizes applicable, evidence-based outcomes measures/questionnaires/scales.
Chapter 3: Linking Advanced Practice Expectations and Professional Responsibilities to Knowledge Areas

Introduction

The following chapter uses sample case scenarios to link practice expectations to knowledge areas. Each scenario has sample questions followed by explanations. The explanations are keyed to the specific numbered items from Chapter 2 (Description of Specialty Practice). These scenarios and references are included as examples only and are not intended to be all-inclusive. The terminology used in the scenarios are from APTA’s Guide to Physical Therapist Practice, and familiarity with the Guide will facilitate the reader’s understanding of the cases.

Case Scenario 1
The patient is a 21-year-old, sexually active, female college student who takes oral contraceptives. She has a body mass index of 29 and experienced a pulmonary embolism after a two-hour airplane flight. She is having difficulty understanding how a woman her age could have a pulmonary embolism.

Question: Which of the following modifiable risk factors would be the most important to discuss with this patient in order for her to understand this occurrence?

a) Genetic clotting disorder.
b) Birth control medication.
c) Obesity.
d) Air travel.

The correct answer is b.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:

I. Knowledge area
   C. Clinical sciences
      8a. Epidemiology

The specialist needs to complete a risk factor assessment, link a patient’s history and presentation with the most likely associated risk factors, and tailor the education to the patient. According to research evidence, women who take oral contraceptives are 2-4 times as likely as women not taking oral contraceptives to experience venous thromboembolism. While the other three answers are risk factors for venous thromboembolism, a genetic clotting disorder is not modifiable, the patient’s BMI is slightly below the obesity threshold, and the air travel was too short to be a significant risk factor.

Supportive Reading
Case Scenario 2
A 62-year-old woman weighing 65 kg is admitted to the intensive care unit with acute respiratory failure. Chest radiograph is consistent with acute respiratory distress syndrome. Arterial blood gases testing results six hours postintubation shows pH = 7.33, PaO2 = 70, PaCO2 = 54, and HCO3- = 29. Her ventilator is volume controlled with the following settings:

- Fraction of inspired oxygen (FiO2): 60%.
- Positive end expiratory pressure: 20 cm H20.
- Set respiratory rate: 20 breaths per minute.
- Set tidal volume: 370 ml.

The patient is currently intubated, sedated, and not breathing over the ventilator. The nurse reports a Richmond Agitation and Sedation Scale (RASS) of -4. The Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) test has not yet been performed. A physical therapist is consulted and defers out-of-bed evaluation at this time.

Question: Which of the following changes to this scenario would need to occur for the physical therapist to determine that out-of-bed evaluation is now appropriate?

a) A PaO2 of 88 mmHg on the current ventilatory settings.
b) A positive result on the CAM-ICU test.
c) A respiratory rate of 24 on the current ventilator settings.
d) A RASS of -2.

The correct answer is d.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:

III. Patient and client management expectations
B. Evaluation

The specialist must evaluate patient data in order to make a safe decision regarding out-of-bed mobilization of patients who are in the ICU. The current respiratory rate of 20 breaths per minute and the current PaO2 of 70 mmHg do not contraindicate an out-of-bed mobility assessment; therefore, any change in these parameters would not make the PT treatment more appropriate. A result of the CAM ICU, either negative or positive, is not a contraindication to mobility. The only contraindication to mobility in this scenario is the RASS of -4. An improved RASS score of -2, defined as the patient briefly (less than 10 seconds) awakens with eye contact to voice, would allow for an out-of-bed mobility assessment.

Supportive Reading
Case Scenario 3
A hospital administrator is requesting justification for the continuation of the current outpatient physical therapy pulmonary rehabilitation program. The physical therapist in charge of the program gathers data from the past two years comparing two patient subgroups: patients with chronic obstructive pulmonary disease and patients with idiopathic pulmonary fibrosis. The physical therapist compares the pre- and postrehabilitation distance changes in the 6-Minute Walk Test and finds that the data fits the normal distribution.

Question 1: Which of the following statistical tests should be used to determine if there is a significant difference between pre- and postrehabilitation walking distance?
   a) Chi-square test.
   b) Factor analysis.
   c) Multiple linear regression.
   d) Paired t test.

The correct answer is d.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:

I. Knowledge Area
   D. Critical Inquiry Principles and Methods
      3. Develops appropriate project design and methodology

The specialist would be skilled in the management of patient outcomes data, including selection and use of statistics to justify interventions based on outcomes. In this case, the physical therapist would compare pretest and posttest data in each of the two groups of patients, comparing the change (or difference) in one variable (walking distance) from pre- to postrehabilitation. This type of data is best described by descriptive statistics. Although two populations are mentioned (patients with COPD and those with IPF), the populations are not being directly compared to each other. The physical therapist is calculating the overall change in 6MWT distance from pre- to postrehabilitation for the individuals in both groups. The chi-square test is used to analyze the difference between independent variables of nominal data; the data used in this case is ratio data, making the chi-square test inappropriate for this analysis. A factor analysis correlates a number of factors with a variable that is broadly understood, such as socioeconomic factors. Multiple linear regression is used to explain relationships between one dependent variable and more than one independent variable. Factor analysis and multiple linear regression are inferential statistics, and thus are not appropriate for this analysis. A paired t test uses ratio/interval data (distance) of dependent variables (two results for the same person) and analyzes the differences between the two sets of data. This would be the most appropriate test to use for this study.

Supportive Reading
Question 2: The results of the statistical test in Question 1 showed that the mean difference between the pre- and postrehabilitation walking distance was 57 meters for the group of patients with COPD, which make up 90% of this program’s patient population. These results did not reach statistical significance. What conclusion could be drawn with regard to the future of pulmonary rehabilitation for patients with COPD at this facility?

a) The pulmonary rehabilitation program should be continued because there was a clinically significant difference between the pre- and posttest data.

b) The pulmonary rehabilitation program should be continued until a statistically significant difference can be established between the pre- and posttest data.

c) The pulmonary rehabilitation program should be discontinued because there was not a clinically significant difference between the pre- and posttest data.

d) The pulmonary rehabilitation program should be discontinued because there was not a statistically significant difference between the pre- and posttest data.

The correct answer is a.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:

I. Knowledge Area
   D. Critical Inquiry Principles and Methods
      3. Develops appropriate project design and methodology

The specialist would be skilled in the interpretation of statistical outcomes to justify interventions based on outcomes. While the difference for patients with COPD was not statistically significant, the data still achieved the minimal clinically important difference (MCID) in the improvement in the 6MWT in patients with COPD. Therefore, the pulmonary rehabilitation program should be continued as a valuable service to patients with COPD. This conclusion relies on the specialist’s understanding that an established MCID is more important to some decision-making processes than relying solely on statistics.

Supportive Reading

Case Scenario 4
A 45-year-old man presents to physical therapy with a chief complaint of left calf pain when running at speeds faster than 10-minute miles. Pain is relieved when he slows to a jog or stops. The physical therapist suspects that the pain is related to peripheral artery disease. Bilateral ankle-brachial indices (ABI) were correctly performed using dorsalis pedis systole: Left-leg ABI = 1.1; right-leg ABI = 1.3. The patient has 1+ dorsalis pedis pulses bilaterally and 2+ posterior tibial pulses bilaterally.

Question: Which of the following is the most appropriate next step to determine the cause of the patient's left lower extremity pain?
   a) Perform a capillary refill test.
   b) Perform an exercise ABI.
   c) Perform a rubor of dependency test.
   d) Retest both ABIs using systole of posterior tibial arteries.

The correct answer is b.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:
 II. Professional Roles, Responsibilities, and Values
      F. Evidence-Based Clinical Practice
           2. Evaluates the efficacy and effectiveness of examination tools

The specialist must be able to use current evidence to determine the best test or measure to use in a patient encounter. The capillary refill test and the rubor of dependency test are less specific tests to diagnose arterial disease than the ABI, which already was completed. The case indicates that the ABI was performed correctly, meaning that the systole of the dorsalis pedis was the larger of the two artery systoles. An increased rating of the pulse in the posterior tibialis does not indicate that the systole of that artery would be higher, making this an incorrect answer. An exercise ABI is the needed next step to determine if peripheral artery disease is the cause of the patient's leg pain during exercise.

Supportive Reading
Case Scenario 5
A 74-year-old woman who was admitted to the hospital for management of an exacerbation of heart failure is now medically stable and ready for discharge. A physical therapist is consulted to assist with discharge planning. The patient is currently able to ambulate 75 feet (23 meters) independently using a standard cane. She prefers to be discharged to her home, where she lives with her spouse.

Question: Which of the following additional examination results would most likely indicate the need for discharge to a rehabilitation facility rather than discharge to her home?

a) Activity Measure Post Acute Care (AM-PAC) score = 21.
c) Richmond Agitation and Sedation Score (RASS) = 0.
d) Self-selected walking speed of 0.08 m/sec.

The correct answer is d.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:

III. Patient and Client Management Expectations
   C. Diagnosis
   D. Prognosis
   G. Outcomes

The specialist would use outcome measures in order to best predict a patient's discharge destination. An AM-PAC score of greater than 18 indicates that a home discharge is likely. The CAM-ICU, valid only in the ICU, determines level of delirium; a negative result implies that there is no delirium present. A RASS determines level of consciousness; a score of 0 indicates the patient is alert and calm. Both the CAM-ICU and the RASS would not be useful to predict discharge to either setting in this case. A self-selected walking speed of 0.08 m/sec is a low speed, which indicates that discharge to a rehabilitation facility is the most appropriate recommendation for this patient.

Supportive Reading
**Case Scenario 6**

A 66-year-old man is referred to outpatient physical therapy after discharge from the hospital following treatment for heart failure. Four minutes into the 6-Minute Walk Test, he experiences shortness of breath at a rating of 7 out of 10.

**Question:** Which of the following is the most appropriate next step?

- a) Continue the test for 2 more minutes without the patient resting.
- b) Continue the test for 2 more minutes with the patient resting as needed.
- c) Discontinue the test and try again at the next physical therapy session.
- d) Discontinue timing while the patient rests, resume timing when he is ready.

*The correct answer is b.*

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:

II. Professional Roles, Responsibilities, and Values

   F. Evidence-Based Clinical Practice

      2. Evaluates the efficacy and effectiveness of examination tools

III. Patient/client management expectations

   A. Examination

      3. Tests and measures

The specialist should be knowledgeable about the performance of a standardized test like the 6MWT. During the test, patients are allowed to stop and rest, though the timer continues to run. Total distance covered during the 6 minutes, regardless of whether there were rest periods or not, is the result of this test. Shortness of breath alone in this scenario does not justify discontinuing the test.

**Supportive Reading**


Case Scenario 7
A 57-year-old man is brought to the emergency department due to right-sided chest pain, worsening shortness of breath, fever, and a 3-day history of a cough producing small amounts of secretions.

Current vital signs:
Temperature = 39.4°C (103.0°F).
Heart rate = 80 beats/minute.
Respiratory rate = 32 breaths per minute.
Blood pressure = 152/88 mmHg.

Chest auscultation:
Coarse crackles throughout the lung fields (right > left).
Dullness to percussion over the right posterior base and mid-lung areas.

Complete blood count:
White blood cell count = 18,000 cells/mcL.
Hematocrit = 46%.
Platelets = 230,000 cells/mcL.

Arterial blood gas on room air:
pH = 7.44.
PaCO₂ = 28 mmHg.
PaO₂ = 58 mmHg.
HCO₃⁻ = 21 mEq/L.

Imaging:
A plain chest x-ray shows right lower lobe and potential right middle lobe consolidation.

Question 1: Which of the following is the best rationale for the relationship between the patient’s vital signs and arterial blood gas analysis findings?

a) The altered blood pressure is related to the HCO₃⁻ level.
b) The altered heart rate is related to the PaO₂ level.
c) The altered respiratory rate is related to the PaCO₂ level.
d) The altered temperature is related to the pH level.

The correct answer is c.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:
I. Knowledge Areas
   A. Foundation Sciences
   C. Clinical Sciences

The specialist should be able to interpret the results of an arterial blood gas analysis as they relate to the patient’s clinical presentation. There is no direct relationship between blood pressure and the metabolic HCO₃⁻ level; nor is there a relationship between the patient’s normal heart rate and the PaO₂ level. Body temperature does not alter pH levels. The elevated respiratory rate, which would increase minute ventilation, will decrease the PaCO₂ level, which is the only correct answer.
Supportive Reading


Question 2: The patient is treated with supplemental oxygen, which results in improved arterial blood gases and vital signs. Which of the following is the best physical therapist intervention for this patient’s pulmonary dysfunction at this time?

a) Diaphragmatic breathing.
b) Positive expiratory pressure (PEP) device.
c) Assisted cough techniques.
d) Inspiratory muscle training.

The correct answer is b.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:

III. Patient and Client Management Expectations
   E. Plan of Care
   F. Intervention

The specialist would determine a differential diagnosis of bacterial pneumonia based on increased temperature, increased white blood cell count, and x-ray findings. Therefore, secretion removal techniques are indicated. Diaphragmatic breathing alone is not an airway clearance technique. The patient has been coughing for a few days and clearing some secretions, which would make it unlikely that cough assistance is necessary. There is no indication of inspiratory muscle weakness, making inspiratory muscle training inappropriate. The use of the PEP device is the best choice, since this is an airway clearance technique which will improve this patient’s current consolidation.

Supportive Reading

Case Scenario 8
A 74-year-old woman is admitted from the emergency department because of shortness of breath associated with chest tightness. She has a one-week history of dyspnea on exertion. She has moderate improvement of symptoms with sublingual nitroglycerin.

Past medical history includes coronary artery disease, coronary artery bypass graft (CABG) 10 years ago, myocardial infarction with subsequent angioplasty with stent placement 7 years ago, diastolic heart failure and supraventricular tachycardia (SVT) diagnosed 1 year ago.

Current vital signs:
Temperature = 36.9°C (98.4°F)
Heart rate = 130 beats/minute (irregular)
Respiratory rate = 24 breaths/minute
Blood pressure = 148/76 mmHg
Oxygen saturation = 92% on room air

Cardiac testing:
Electrocardiogram reveals atrial fibrillation with rapid ventricular response rate (A-fib with RVR) of 130, and ST-segment depression in leads II, III, and augmented Vector Foot (aVF).

Echocardiogram shows normal ventricular cavity size, 3+ mitral regurgitation, left ventricular ejection fraction of 44%, and hypokinesis of inferior wall.

Physical exam:
Right carotid bruit, jugular venous distension present.
Distal pulses are 2+ bilaterally; no peripheral edema is present.
Cardiac auscultation discloses an irregular heart rhythm, 4/6 systolic murmur (best heard at apex), and presence of the third heart sound (S3), but no S4.
Pulmonary auscultation reveals crackles in the lower lung fields (left > right).

Question 1: Which of the following best explains the auscultatory findings of this patient?

a) Hypertrophic cardiomyopathy, as indicated by carotid bruit.
b) Pneumonia, as indicated by crackles in lower lung fields.
c) Pulmonary edema, as indicated by absence of S4.
d) Valvular structural abnormality, as indicated by the systolic murmur.

The correct answer is d.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:

III. Patient and client management

B. Evaluation

The specialist needs to have advanced clinical skills and the ability to interpret examination findings into an accurate evaluation. This question requires knowledge of auscultation examination skills integrated with cardiovascular disease pathophysiology. The patient data states that the patient does not have a fever, making an infection or pneumonia unlikely. The echocardiogram shows normal ventricular chamber size. Hypertrophic cardiomyopathy would typically show a decrease in ventricular chamber size and would not be linked to a carotid bruit, a finding of carotid stenosis. This patient has acute fluid overload that would result in pulmonary edema, but edema would be confirmed by the presence of S3, not by the absence of S4. The patient has a 4/6 systolic murmur, indicative of mitral valve regurgitation, confirmed by echocardiography, making valvular structural abnormality the best answer to this question.
Supportive Reading

Question 2: Which of the following is the best rationale to explain this patient’s cardiac dysfunction?

a) Decreased venous return from inactivity, resulting in altered jugular venous distension.
b) Demand coronary ischemia from pulmonary pathology, causing acute heart failure.
c) Hypoperfusion of the posterior descending coronary artery, causing acute heart failure.
d) Mitral regurgitation from valvular insufficiency, causing anterior descending coronary ischemia.

The correct answer is c.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:
III. Patient and client management
B. Evaluation

The specialist would interpret examination findings using knowledge of cardiovascular disease pathophysiology, specifically heart failure and ischemic heart disease. This patient is in acute fluid overload and has mitral regurgitation. Decreased venous return would not result in jugular venous distension, and pulmonary pathology is not the cause of this patient’s acute heart failure/fluid overload, making both answers incorrect. Mitral regurgitation, which this patient does present with, does not cause coronary ischemia, and the hypokinesis is in the inferior wall, not the anterior wall (supplied by the left anterior descending artery), making this answer incorrect. The ST-segment depression in ECG leads II, III, and aVf would indicate ischemia from the posterior descending coronary artery. This ischemia would cause the hypokinetic inferior wall seen on the echocardiogram and would cause the cardiac dysfunction, making this the correct answer to this question.

Supportive Reading

Question 3: Which of the following is the best indication for coronary angiography at this time?

a) History of heart failure and A-fib with RVR.
b) History of CABG with current ST depression.
c) History of myocardial infarction with systolic murmur over left apex.
d) History of SVT with crackles in lower lung fields.

The correct answer is b.

To answer this question, the cardiovascular and pulmonary clinical specialist would incorporate the following knowledge and practice management expectations:
I. Knowledge Area
A. Foundational Sciences

The specialist needs to understand the purpose of tests and measures not performed by a physical therapist. Coronary angiography has the ability to isolate the path of a coronary artery but provides no information regarding cardiac rhythm (AFib with RVR, SVT) or murmurs. The patient in this case has a history of CABG and has current signs and symptoms of cardiac ischemia, requiring further investigation by angiography.

Supportive Reading
Chapter 4: Examination Content Outline and Medical Conditions Seen by Cardiovascular and Pulmonary Clinical Specialists

### Examination Content Domain

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<tr>
<th>Examination Content Domain</th>
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<td><strong>II. Professional roles, responsibilities, and values</strong></td>
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<td>A. Professional behaviors, leadership, education, administration, consultation</td>
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<td>B. Evidence-based clinical practice, including critical inquiry principles and methods</td>
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<td><strong>III. Patient and client management expectations</strong></td>
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<tr>
<td>E. Outcomes</td>
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<tr>
<td><strong>TOTAL</strong></td>
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### Medical Conditions Seen by Cardiovascular and Pulmonary Specialists

The following lists represent the commonly seen conditions that could be seen by cardiovascular and pulmonary clinical specialists as assessed on the 2016 DSP Revalidation Survey. They are listed by frequency and rank within each category.

#### Cardiovascular Conditions

**Conditions Seen Frequently**

- Atherosclerotic disease.
  - Coronary atherosclerosis.
  - Peripheral arterial occlusive disease.
  - Peripheral arterial disease.
  - Intermittent claudication.
- Venous stasis, with or without cellulitis.
- Peripheral vascular complications of diabetes.
- Aneurysms (aortic, abdominal).
- Cardiomyopathy (all types, including viral, EtOH, and others).
- Heart failure with reduced or preserved ejection fraction.
- Cor pulmonale/right heart failure.
- Patients at high risk for development of cardiovascular disease or complications.
- Hypertension.
- Hypertensive heart disease.
• Cardiovascular complications of diabetes.
  • Ischemic conditions.
    — Angina.
    — Myocardial infarction (acute/chronic).
    — Intermediate coronary syndrome.
• Valvular disorders.
• Rhythm disturbances/dysrhythmias.
  — Status post ablation.
• Status post coronary artery bypass graft.
• Status post cardiac pacemaker insertion (permanent, all types).
• Status post aortofemoral or other vascular bypass grafts.
• Status post defibrillator implant.
• Status post vascular stent placement.
• Status post heart valve replacement.

Conditions Seen Occasionally
• Status post heart transplant.
• Status post heart-lung transplant.
• Ischemic conditions, Printz metal angina.
• Postural orthostatic tachycardia syndrome.
• Other orthostatic intolerance.
• Lymphedema.
• Pericarditis.
• Status post implantable loop monitor.
• Status post extracorporeal membrane oxygenation.
• Status post intra-aortic balloon pump.
• Status post aortic dissection repair.
• Status post aortic aneurysm repair.
• Status post ventricular assist device placement.
• Status post correction of congenital heart defects.
• Septal defect, atrial or ventricle.

Conditions Seen Rarely
• Lymphadenopathy.
• Patent ductus arteriosus.
• Coarctation of the aorta.
• Tetralogy of fallot.
• Common ventricle.
• Transposition of great vessels.
• Eisenmenger syndrome.

Pulmonary Conditions

Conditions Seen Frequently
• Adult respiratory distress syndrome.
• Atelectasis, adult primary.
• Pulmonary edema.
• Pulmonary artery hypertension.
• Pulmonary effusion.
- Pulmonary embolism.
- Pulmonary fibrosis, primary/idiopathic.
- Emphysema.
- High risk for development of pulmonary disease or complications.
- Acute upper respiratory infection.
- Pneumonia.
  - Aspiration.
  - Bacterial.
  - Viral.
- Postoperative pulmonary complications (other than atelectasis).
- Primary pulmonary hypertension.
- Acute respiratory failure.
- Status post tracheotomy.
- Status post other thoracic surgery.

**Conditions Seen Occasionally**
- Asthma.
- Bronchiectasis.
- Bronchitis (acute or chronic).
- Bronchiolitis.
- Bronchiolitis obliterans.
- Cystic fibrosis.
- Pulmonary fibrosis, iatrogenic (radiation/chemotherapy).
- Pneumococcal pneumonia.
- Bronchopneumonia.
- Influenza.
- Lung abscess.
- Empyema.
- Neoplastic diseases.
  - Carcinoma in situ (bronchus/lung).
  - Malignant neoplasm (larynx/pleura, trachea/bronchus/lung).
- Orthopedic impairment (fractured ribs, flail chest, kyphoscoliosis).
- Paralysis of the diaphragm or hemidiaphragm.
- Pneumothorax.
- Sarcoïdosis.
- Status post lung transplant, single or double.
- Status post lung reduction or resection.
- Status post esophagectomy.
- Status post abdominal surgery.

**Conditions Seen Rarely**
- Atelectasis, newborn.
- Bronchopulmonary dysplasia.
- Graft versus host disease.
- Hepatopulmonary syndrome.
- Meconium aspiration.
- Pneumoconiosis.
- Spinal cord lesion or injury (cervical, thoracic, lumbosacral).
- Tuberculosis.
Chapter 5: Executive Summary of the Cardiovascular and Pulmonary Practice Analysis and Discussion

Introduction

A practice analysis is a systematic study of professional practice behaviors and content knowledge that specialty practice comprises. The purpose of a practice analysis is to collect data that will describe what cardiovascular and pulmonary clinical specialist practitioners do, and what skills and knowledge bases enable them to perform specialist practice. The data are then used to describe specialty practice in clinical cardiovascular and pulmonary physical therapy. The description of specialty practice defines the content areas for the specialist certification examination in clinical cardiovascular and pulmonary physical therapy. Following is a summary of the practice analysis research on clinical specialization in cardiovascular and pulmonary physical therapy, resulting in this DSP.

In January 2015, the Specialty Council for Cardiovascular and Pulmonary Physical Therapy was charged with the task of revalidating cardiovascular and pulmonary specialty practice. This was the first such revalidation performed since 2007. The council selected a revalidation project team subject matter expert group representing a diversity of ages, practice settings, geographic areas, and length of time as a specialist. A paid consultant was contracted to guide the SME group and revalidation process.

The goal of the practice analysis was to revalidate and revise the “Cardiovascular and Pulmonary Physical Therapy Description of Specialty Practice” for publication in 2017. The revision was based on the expanded practice of cardiovascular/pulmonary physical therapy in the past 10 years and served to align the DSP with the revised Guide to Physical Therapist Practice, increasing emphasis on evidence-based practice and cutting-edge technologies such as mechanical circulatory devices, regenerative medicine, and telehealth. The American Board of Physical Therapy Specialties funded the revalidation process.

Methods

Survey Development

Competency statement development. Prior to the first group meeting, with guidance from the consultant, the SME group used electronic communication to (1) identify in advance changes in cardiovascular and pulmonary clinical specialty practice over the prior 10 years (e.g., interventions no longer in being practiced and those possibly still being practiced but no longer at the level of a specialist), and (2) review the 2007 DSP to determine what needed to be added to or revised from the 2007 DSP survey items. SME group members also were encouraged to talk with their professional colleagues to garner their input regarding changes in the past 10 years along with emerging trends in the practice of cardiovascular and pulmonary specialty practice. Using this information, the SME group met in August 2015 and began with a thoughtful discussion of changes in the practice of the specialty and health care in general in the past 10 years, as well as emerging trends. The group also carefully reviewed the 2007 DSP knowledge areas, professional roles and responsibilities, and practice dimensions compared to identified changes and trends. The result of these discussions and review was the basis for the DSP revalidation/revision survey. While the group was sensitive to the idea that, with changes in entry-level doctor of physical therapy education, some of the items likely were no longer considered to be at the advanced practitioner level, the group made the decision to resurvey existing items in the DSP to allow for broader input from survey respondents. In addition, the SME group noted that the 2007 DSP was lacking in some tests and measures items, as well as interventions. From review of the results section of the 2007 DSP, it was not clear if some items intentionally had been deleted from the 1997 DSP based on 2007 survey data or if they were deleted inadvertently. At any rate, the SME group added a number of items to the survey specific to tests and measures and interventions. To add clarity to existing items, the SME group also rewrote a
number of items from the 2007 DSP. Following the two-day meeting, the SME group continued to discuss and refine the survey items.

Development of the Pilot Survey

The survey items were developed and refined by consensus of the SME group and informed by the Guide to Physical Therapist Practice (guidetoppractice.apta.org) and its Patient/Client Management Model, the existing 2007 “Cardiovascular and Pulmonary Physical Therapy Description of Specialty Practice,” and work by Sackett and colleagues (Straus SE, Glasziou P, Richardson WS, Haynes RB: “Evidence-Based Medicine: How to Practice and Teach It,” Churchill Livingstone, 2011, ISBN 978-0702031274). on evidence-based medicine. Further design and administration of the survey was per ABPTS guidelines.

The survey contained four sections, predefined by ABPTS. Section 1 addressed knowledge areas expected of the cardiovascular and pulmonary clinical specialist. Items were rated using a Likert-type scale for: frequency (0 “never” to 4 “daily”); importance (0 “not important” to 3 “very important”); and level of judgment (0 “do not use” to 3 “analysis.” Section 2 dealt with professional roles and responsibilities, and section 3 focused on practice expectations in patient and client management. Both sections 2 and 3 were rated on the same scales of frequency and importance, and an additional 4-point level of mastery scale (1 “advanced beginner” to 4 “expert”). Section 4 contained demographic questions which mirrored Chapter 1 of the 2007 DSP. However, for demographics specific to gender, race, and age, the SME group relied on existing data on all board-certified cardiovascular and pulmonary clinical specialists.

Pilot Testing

The purpose of the pilot survey was to ensure clarity of the survey questions and identify any new competencies that should be incorporated into the final survey. Although it would have shortened the survey and time commitment for respondents, due to the small number (204 in 2016) of board-certified cardiovascular and pulmonary clinical specialists, the SME group did not feel it would be appropriate to divide the survey by sections and ask respondents only to complete some of the sections.

The proposed survey was submitted to the American Board of Physical Therapy Specialties (ABPTS) for approval prior to pilot testing and revision. ABPTS staff uploaded the survey to Survey Monkey, and pilot testing was completed in the spring of 2016 with a small convenience sample of identified subject matter experts (n = 32) who were cardiovascular and pulmonary clinical specialists. Based on the survey results (22 responses, for a 69% response rate) and feedback in the form of written comments on the pilot survey, the SME group submitted a final survey to ABPTS for approval. Other than minimal editorial changes, the SME group made no changes between the pilot and final surveys. Therefore, the pilot survey results were included in the final analysis.

Final Survey Administration

In November 2016, the final survey was successfully electronically delivered to 298 physical therapists. The sample consisted of a random selection of 50% of the current cardiovascular and pulmonary board-certified clinical specialists and an equivalent number of nonspecialist members of the Cardiovascular and Pulmonary Section of APTA. ABPTS staff sent follow-up emails to nonrespondents and to those who had partially completed the survey. Respondents were given an opportunity to call or e-mail the project coordinator or project consultant if they had questions about the survey. Inquiries were received from two potential respondents with questions related to their eligibility to complete the survey. The survey was closed in February 2017.
Data Analysis

At their first meeting, the SME group set a priori decision rules as follows: In section 1 (knowledge areas), items would be included if at least 75% of respondents rated the item on importance at a 2 or 3 ("moderately important" or "very important") and on level of judgment at a 2 or 3 ("application" or "analysis"). For section 2 (professional practice expectations: professional roles, responsibilities, and values) and section 3 (practice expectations, patient and client management), items would be included in the DSP if at least 75% of the respondents rated the item on importance at a 2 or 3 ("moderately important" or "very important") and on level of mastery at a 2 or 3 ("proficient" or "expert" skill level). Concerning frequency, items would be included if at least 75% of respondents rated the item at a 3 or 4 ("daily" or "weekly"). In the event of discrepancy, such as importance rating at 75% and level of mastery at less than 75%, the SME would review and compare the responses of board-certified cardiovascular and pulmonary clinical specialists to responses from nonspecialist participants, and come to consensus about keeping or eliminating the item. The rationale for eliminating an item would be that the item is something that an entry-level PT and the specialist both use or perform, although it is not an item that distinguishes between them. The frequency of medical diagnoses seen were determined by the number of patients treated by the specialist over the past 2 years. If more than 50 patients treated the diagnosis was rated as "frequently", if between 10-50 patients treated the diagnosis was rated as "occasionally", if less than 10 patients treated the diagnosis was rated as "rarely", and if no patients treated then "never."

Results

A total of 87 of 298 electronically opened surveys were completed, for a response rate of 28.2%. 82 completed surveys (94.3%) were completed by respondents who identified themselves as practicing at the specialist level. Five completed surveys (5.7%) were received from respondents who indicated they were not practicing at the specialist level. The SME group felt that this small number was insufficient to compare responses of specialists to nonspecialists, thus the data was combined for review.

A number of items were identified for review based on the previously agreed upon decision rules of frequency, importance, or mastery. The decision rules for Section 1 included at least 75% of respondents rating the item to be at least moderately important and at least application for level of judgement and performed at least weekly. The decision rules for Section 2 and 3 included at least 75% of respondents rating the item to be at least moderately important with a level of mastery at least at the proficient level and performed at least weekly. The SME group felt the items that were identified as Important, used at high Levels of Judgement or Mastery but lower in Frequency were related to situations that do not occur often in the clinic, such as responding to emergencies, employing Advanced Cardiac Life Support, or fulfilling certain professional responsibilities such as advocacy or membership involvement. If the items were rated as high in Importance, and Judgement or Mastery, but low in Frequency were retained in the survey. Some items were included in the survey because the SME group felt they reflect changes in practice and emerging trends (e.g., interventional radiology, regenerative medicine). Although these items did not meet the decision rules, with all but three exceptions, the SME group decided to retain the items in the revised DSP to maintain relevance for the next ten years. New survey items specific to tests and measures, and interventions performed well in the survey. The SME Group did add or change some of the example explanations specific to individual items for improved clarification along with minor editorial changes and updates.

Section 4

Section 4 of the survey included demographic questions. This information is reported in Chapter 1.
Examination Blueprint. Based on review of the survey results, the SME group made changes to the Examination Blueprint (Chapter 4 of the DSP). These changes reflected changes in terminology and items that were not on the previous survey/examination blueprint, but they also provided emphasis on the patient and client care model, especially with respect to evaluation, which is the hallmark of the specialist. Questions in Section 4 addressed the frequency with which specific cardiovascular and pulmonary conditions were seen clinically. That information is reflected in the Examination Blueprint. The SME group used the following definitions of frequency for those conditions: “never,” “rare” (<10 patients in the past two years), “moderate” (10-50 patients in the past 2 years), and “frequently” (>50 patients in the past two years).

Conclusions

The broad representation of SME group members and the level of consensus regarding survey analysis indicated that the documents resulting from the process of revalidation can be relied on to accurately reflect cardiovascular and pulmonary specialty practice in 2017. The dedication of all members to the process and careful reflection and discussion of each item was exceptional. The work put in by the SME group demonstrates their dedication to the practice and progression of physical therapy in the cardiovascular and pulmonary field for today and in the future.