Post-intensive Care Syndrome (PICS): Early Recognition and Evaluation

Session Date & Time: Friday, February 17, 2017, 3:00 PM - 5:00 PM

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Course Description: Over 80% of survivors of critical illness experience post-intensive care syndrome (PICS). PICS is a constellation of physical, cognitive and mental health problems after intensive care including prolonged muscle weakness, reduced performance of activities of daily living, diminished ambulation and strength, post-traumatic stress disorder, and anxiety that persists for months and years. PICS is a relatively recently described syndrome and many physical therapists in acute and sub-acute care, outpatient, and home care settings may not be familiar with the patient presentation, evaluation strategy, and interventions for these individuals. Using evidence from our recent systematic review, this session will characterize the physical impairments, activity limitations, and participation restrictions experienced by individuals with PICS during their first year following survival of an episode of critical illness. Strategies for outpatient clinic and home-based physical therapy examination and evaluation of this unique patient population will be discussed. Recent clinical trials of interventions for individuals with PICS aimed at reducing physical impairments and restoring functional activity and community participation will be presented. This course will conclude with a discussion of current challenges associated with the evaluation and physical therapy management of individuals with PICS and offer some potential solutions.

Course Objectives: Upon completion of this course, you will be able to-
1. Describe the prevalence of physical impairments, activity limitations, and participation restrictions of patients with PICS during the first year following critical illness.
2. Select evidence-based tests and measures to objectively quantify physical impairments, activity limitations, and participation restrictions for patients with PICS.
3. Describe current interventions and their effectiveness in managing PICS symptoms.
4. Discuss current challenges and potential solutions for the examination and management of patients with PICS in in-patient rehabilitation program, outpatient clinic, or home care settings.
Course Outline:

1. Etiology of post-intensive care syndrome (PICS)
   a. Long-term outcomes after critical care
      i. Pulmonary
         1. Impairment in spirometry, lung volumes, and diffusion capacity
      ii. Neuromuscular
         1. Critical illness polyneuropathy, critical illness myopathy, disuse atrophy
      iii. Activity and participation
         1. Performance of ADL and IADL, reduced 6-minute walk distance, fatigue
      iv. Psychiatric
         1. Depression, posttraumatic stress disorder, anxiety
      v. Cognitive
         1. Impairment in memory, attention, executive function, mental processing speed
      vi. Low rate of return to work & increased healthcare utilization
      vii. Family burden
         1. Anxiety, PTSD, depression, complicated grief
         2. Physical care

2. Clinical Presentation of Patients with PICS – an ICF Approach
   a. Purpose – The purpose of this systematic review is to identify the scope and magnitude of physical problems associated with PICS during the first year after discharge from ICU, using the ICF framework to elucidate the impairments of body functions and structures, activity limitations, and participation restrictions.
   
   b. Systematic Review Methodology
      i. Used the PRISMA (Preferred Reporting Items for Systematic review and Meta-Analysis) checklist to inform and report this systematic review.
      
      ii. The SR was initiated in December 2014 and is registered with the International Prospective Register of Systematic Reviews (PROSPERO)
      
      iii. Study selection criteria were established a priori
         1. Participants – Community dwelling adults aged ≥18 years.
         2. Exposure – Medical conditions, general surgical procedures, trauma, and burns resulting in critical illness requiring management in an intensive care unit.
         3. Comparison – 1) Control group who did not experience critical illness and/or 2) Published normative data for outcomes of interest, and/or 3) Retrospective self-reports of impairments, activity limitations, and participation restrictions within a month prior to developing the critical illness.
4. **Outcomes** – 1) Physical impairments (problems with body functions and structures), 2) Activity limitations (problems with the ability to execute tasks or actions), 3) Participation restrictions (problems with the ability to be involved in a life situation).

5. **Time** – Up to one year following hospital discharge.

iv. **Exclusion criteria** – Participants with any of the following diagnoses: Cancer diagnoses, neurological pathology or surgery, cardiovascular surgery, or pregnancy.

v. **Limits** – Studies were limited to all relevant observational studies (cohort studies and case control) published in the English language in peer-reviewed journals.

vi. **Search procedure** – Medline (Ovid), Cochrane Database of Systematic Reviews (Ovid), Cochrane Central Register of Controlled Trials (Ovid), Pubmed, CINAHL (EBSCO), Web of Science, and EMBASE were systematically searched for observational studies reporting the physical impairments of body functions and structures, activity limitations, and participation restrictions associated with PICS.

vii. **Article Assessment** - Two reviewers assessed the identified articles for eligibility according to pre-specified selection criteria, after which an independent reviewer performed data extraction that was validated by a second independent reviewer. Quality appraisal was performed by two independent reviewers. Outcomes of the included studies were summarized in tables and narrative format.

c. **Outcomes** – we identified reports of impairments in:

i. Body Structure and Function
   1. Respiration
   2. Respiratory Muscle Function
   3. Muscle Power Function (strength)

ii. Activity
   1. Exercise tolerance
   2. Balance (involuntary movement reaction function)

iii. Participation
   1. Daily routine (ADLs)
   2. Community Life
   3. Remunerative employment
   4. Driving
3. Examination and Evaluation - Tests and Measures to Objectively Quantify PICS
   a. Body Structure and Function Impairment
      i. Respiration
         - Spirometry measurements
      ii. Respiratory Muscle Function
         - Pulmonary function testing
      iii. Muscle Power Function (strength)
         - Muscle strength testing
            a. Hand dynamometer
               i. See Fan et al., 2014, Poulsen et al., 2013
            b. Dynamometer
               i. See vanAswegen et al., 2008
            c. Isometric contractions
               i. See Poulsen et al, 2013
      - MRC Sum Score
         a. Many individuals experience ICU acquired weakness (ICUAW) that persists after ICU and hospital discharge.
         b. Compute the MRC Sum Score to identify the presence and resolution of ICUAW.
         c. Determined as the sum of the manual muscle test using the Oxford 0 - 5 scale for the following muscle groups bilaterally – shoulder abduction, elbow flexion, wrist extension, hip flexion, knee extension, and dorsiflexion.
         d. Scoring: the maximum score is 60 and a score of < 48 is consistent with ICUAW.
         e. See Ciesla N et al., 2011 for an excellent article on measuring MRC Sum Score; Stevens et al., 2009.

   b. Activity Limitations
      i. Exercise tolerance
         1. 6 Minute Walk Test
            a. Measures functional exercise ability
            b. MCID ~ 25 - 50 meters depending on patient population; has not been determined for individuals with PICS
         2. Physical Function in the ICU (PFIT)
            a. Measures functional ability and muscle strength
            b. Used in the ICU but may be relevant to continue to use following hospital discharge
            c. See Skinner et al., 2009; Denehy et al., 2012; Nordon-Craft et al., 2014

      ii. Balance (involuntary movement reaction function)
         1. Berg Balance Scale
a. Measures balance  
b. Scoring: <45/58 indicates an increased risk for falls  
c. See Berg et al., 1992; Denehy et al., 2014  

2. Timed Up and Go  
a. Measures functional mobility  
b. Scoring: >13.5 secs indicates an increased risk for falls  
c. See Podsiadlo et al., 1991; Shumway-Cook et al., 2000; Salisbury et al., 2010; Denehy et al., 2014  

3. 5 Times Sit to Stand  
a. Measures functional transfer mobility  
b. Scoring: >12 secs indicates an increased risk for falls  
c. See Lord et al., 2002; Tiedemann et al., 2008; Denehy et al., 2014  

c. Participation Restriction  
   i. Daily routine (ADLs)  
      1. Katz Activities of Daily Living  
         a. Measures level of dependence in activities of daily living  
         b. See Katz et al., 1963; Jackson et al., 2014  
      2. Barthel Index  
         a. Measures self-care and ADL ability  
         b. See Wade et al., 1988; van der Schaaf et al., 2009; Dennis et al., 2011; Elliott et al., 2011  
   ii. Community Life  
      1. Functional Activities Questionnaire  
         a. Measures IADLs; self-report  
         b. See Pfeffer RI et al, 1982; Brummell et al., 2014  
      2. Remunerative employment  
         a. Self-report  
      3. Driving  
         a. Self-report  

4. Survivor stories – refer to links:  
   • https://www.youtube.com/playlist?list=PLsb8sp1zaJWpYFl3CD_nLYoPbGxYkOM3r  
   • http://www.hopkinsmedicine.org/pulmonary/research/outcomes_after_critical_illness_surgery/oacis_videos_news.html  

5. Referrals to other healthcare providers  
   a. Raising awareness about PICS  
      i. Development of a clinical practice guideline on PICS  
      ii. Resource: http://www.mycucare.org/Pages/default.aspx  
   b. Education to health care providers  
   c. Coordination of healthcare services
6. **Interventions** – current evidence for effective management of patients with PICS
   a. The key to effective management of PICS is multi-faceted with the recognition of a constellation of cognitive, psychological, and physical symptoms including prolonged muscle weakness, reduced performance of activities of daily living, diminished ambulation and strength, post-traumatic stress disorder, and anxiety. These symptoms persist for months and years following hospital discharge. Current evidence focuses on ability to provide safe and effective exercise prescription, patient and family training in the ICU in the acute and chronic phases, interprofessional collaboration, and development of clinical practice guidelines in the management of patients with PICS.
   b. Acute phase (hospital, inpatient rehabilitation)
      i. Prevention
      ii. Manage transitions
      iii. Education
      iv. Coordination of services
   c. Chronic phase (home care and outpatient services)
      i. Recognition & validation
      ii. Interventions
      iii. Restoration
      iv. Compensation
      v. Persistence

7. **Challenges and potential solutions** for the management of people with PICS across the continuum of care
   a. Research
   b. Education
   c. Practice
   d. Discussion with audience

References:


