Post-intensive Care Syndrome (PICS):
Emerging Perspectives to Improve Patient Care

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Course Description:
5 million people enter ICUs in the USA each year and over 80% of survivors of critical illness experience post-intensive care syndrome (PICS) – 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. This session will examine the etiology of symptoms comprising PICS and discuss evidence-based tests and measures to objectively examine individuals with PICS. Outcomes from recent clinical trials of interventions for people with PICS will be analyzed and sample intervention programs will be described. This course will conclude with an exploration of challenges associated with the transitions of care experienced by individuals with PICS and offer some solutions.

Course Objectives:
Upon completion of this course, the participant should be able to:
1. Describe the etiology of the physical, cognitive, and psychological symptoms associated with PICS.
2. Describe the spectrum of physical impairments, activity limitations, and participation restrictions experienced by patients with PICS presenting to post-acute rehabilitation programs, outpatient clinics, and home care settings.
3. Select evidence-based tests and measures including interventions to objectively quantify physical impairments, activity limitations, and participation restrictions for patients with PICS.
4. Discuss current challenges and solutions for the management of patients with PICS in in-patient rehabilitation programs, outpatient clinics, and home care settings.

Introduction and etiology of PICS
Long-term outcomes after intensive care

Pulmonary
- Impairment in spirometry, lung volumes, and diffusion capacity

Neuromuscular
- Critical illness polyneuropathy, critical illness myopathy, disuse atrophy

Physical Function
- Performance of ADL and IADL, reduced 6-minute walk distance, fatigue

Psychiatric
- Depression, posttraumatic stress disorder, anxiety

Cognitive
- Impairment in memory, attention, executive function, mental processing speed

Low rate of return to work & increased healthcare utilization

Family burden
- Anxiety, PTSD, depression, complicated grief
- Physical care

Case report: What it was like for the “PT” to become the “patient”?

Medical History and Clinical Presentation

1st pregnancy at age 28
- Complications: cyclic high fevers, endometritis, septic pelvic thrombophlebitis
- Outcomes: clotting disorder, ablated/damaged uterus, possible trigger of autoimmune thyroid deficiency

Despite the impossibilities; 2nd pregnancy at age 40
- High risk pregnancy (age and clotting issues) with shared care
- Placenta accreta (progressed to increta/percreta)
- Labor and delivery at almost 36 weeks (daughter was born premature)
- Health Care Team: Gynecologist, Obstetricians, Oncology Gynecologists, Vascular Surgeons, Urologists, Transfusion Specialists, Specialized Radiologists, Specialized Anesthesiologists

C-section complications
- Ovarian cysts removed and led to increased “cut to sew” time (responded initially well)
- D/C planning challenged; 48 hours post C-section symptoms of high blood pressure, swelling, jaundice, hyperreflexive.
- Increased C-section “cut to sew” time complicated clotting disorder issues; initiated blood transfusions
- HELLP syndrome and multisystem organ failure, transfusions and initial heparin were not completely effective and critical care began with magnesium, heparin dosage change and BP medication.

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Family visit to prep D/C and CCU/ICU instead
- 11 year old son
- Family noticing symptoms of fatigue, swelling worsening, BP rising to critical levels-hypertensive emergency rising to >180/>130
- Critical care began-CCU/ICU limitations on visitors (family impact)

Hospitalization Recovery
- Critical care was 1 week (husband, mother and baby in tow)
- 11 yr old son able to get in CCU to see me
- The next week very much a haze
  - Room was bright for day and dark for night (for the baby?)
  - Advocating for time up and mobile for me (moving early and often)

Physical Impairment Following Critical Illness
Pulmonary- decreased aerobic capacity, high blood pressure
- Walking issues, 2 story home a challenge (bedrooms upstairs)
- Returning to training (runner) challenges with muscle fatigue, muscle stiffness (flexibility issues), plantar fasciitis
- Lung capacity (pneumonia, bronchitis multiple times in up to 3 year post)

Neuromuscular/ICU weakness- multisystem organ failure (now called multiple organ dysfunction syndrome)
- Liver function low (clotting issues, drug metabolism issues)
- Thyroid dysfunction and regulation frustrations (high or low or no regulation)

Cognitive-impairments in memory- had to “chart” meds, “chart” baby feeding times until the ‘fog’ cleared

Psychiatric-not depressed but kept being asked about it?
- Family perspective- just couldn’t keep up with everything like I used to
- No PTSD, but frustrated with MD’s because didn’t feel well and yet everyone would say “your liver function will get better and then your thyroid meds will work and besides…you look so healthy!”

Family Insights
- Advocates (husband, mom, neonatal pediatrician) – Ask Questions
- Healthcare provider trust and partnership. Shared care – Who is the head/captain of the team?
- The children. Motto for daughter, what we shared with our son.
- Support system (friends, family, co-workers, medical personnel-normalcy)
- Health care background helped. The experience reinforced the “listening” part of communication (“heard” the priorities, “caught” the misreads and determined how to focus on the data/tests or not)
Examination – Tests and Measures to Objectively Quantify PICS Using an ICF Approach

Survivors of critical illness experience a constellation of impairments of bodily functions, activity limitations, and participation restrictions. To optimally evaluate and track the individual’s status and response to interventions, it is essential to use appropriate valid and reliable tests and measures.

Impairments

Pain
- Numeric Rating Scale (0 – 10)
  - MCID (minimal clinically important difference) is ~ 2 points.

Range of Motion
- Goniometric measurements are appropriate

Strength
- MRC Sum Score
  - Many individuals experience ICU acquired weakness (ICUAW) that persists after ICU and hospital discharge.
  - Compute the MRC Sum Score to identify the presence and resolution of ICUAW.
  - 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.
  - Scoring: the maximum score is 60 and a score of < 48 is consistent with ICUAW.
  - See Ciesla N et al., 2011 for an excellent article on measuring MRC Sum Score; Stevens et al., 2009.

Activity Limitations

Functioning
- 6 Minute Walk Test
  - Measures functional exercise ability
  - MCID ~ 25 - 50 meters depending on patient population; has not been determined for individuals with PICS
- Incremental Shuttle Walk Test (ISWT)
  - Measures functional ability
  - See Singh et al., 1992; Salisbury et al., 2010
- Physical Function in the ICU (PFIT)
Measures functional ability and muscle strength
- Used in the ICU but may be relevant to continue to use following hospital discharge
- See Skinner et al., 2009; Denehy et al., 2012; Norton-Craft et al., 2014

- Functional Independence Measure (FIM)
  - Measures functional independence in motor and cognitive themes
  - See http://www.udsmr.org/WebModules/FIM/Fim_About.aspx; Dennis et al., 2011

### Balance
- Berg Balance Scale
  - Measures balance
  - Scoring: <45/58 indicates an increased risk for falls
  - See Berg et al., 1992; Denehy et al., 2014

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

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

### Self-Care and ADLs
- Barthel Index
  - Measures self-care and ADL ability
  - See Wade et al., 1988; van der Schaaf et al., 2009; Dennis et al., 2011; Elliott et al., 2011

- Katz Activities of Daily Living
  - Measures level of dependence in activities of daily living
  - See Katz et al., 1963; Jackson et al., 2014

### Participation Restrictions
- Short Form 36 (SF-36)
  - Measures health related quality of life
  - See Chrispin et al., 1997; Dowdy et al., 2006; Fan et al., 2014

### Interventions – Current Evidence for Effective Management of Patients with PICS
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.

Challenges and Potential Solutions for the Management of People with PICS
Across the Continuum of Care

Acute phase (hospital, inpatient rehabilitation)
  o Prevention
  o Manage transitions
  o Education
  o Coordination of services

Chronic phase (home care and outpatient services)
  o Recognition & validation
  o Interventions
    ▪ Restoration
    ▪ Compensation
    ▪ Persistence

Raising awareness about PICS
  o Development of a clinical practice guideline on PICS
  o Education to health care providers
  o Coordination of healthcare services

Future research needs

Resources
Videos

Society of Critical Care Medicine (SCCM) perspectives:
Video series featuring ICU survivors from SCCM (Recovery from the ICU: A
Physician-Survivor’s Story (PICS) – Alison S. Clay, MD) www.youtube.com/sccm500

Patient and Family perspectives
Video links from Vanderbilt University’s ICU Delirium group: A Life Following Critical
Illness http://www.icudelirium.org/testimonials.html

Patients Perspectives on Survivorship after Critical Illness:
Video links from Johns Hopkins Outcomes After Critical Illness & Surgery

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REFERENCES

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Shumway-Cook A, Brauer S, Woollacott M. Predicting the probability for falls in community-dwelling older adults using the Timed Up & Go Test. Phys Ther. 2000 Sep;80(9):896-903.


