

**CURRENT EVIDENCE AND  
PRACTICAL STRATEGIES TO  
PROMOTE EARLY MOBILITY  
THROUGH AN  
INTERDISCIPLINARY APPROACH**

**COVENANT HEALTHCARE**

**OCTOBER 21, 2021**

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# OVERVIEW

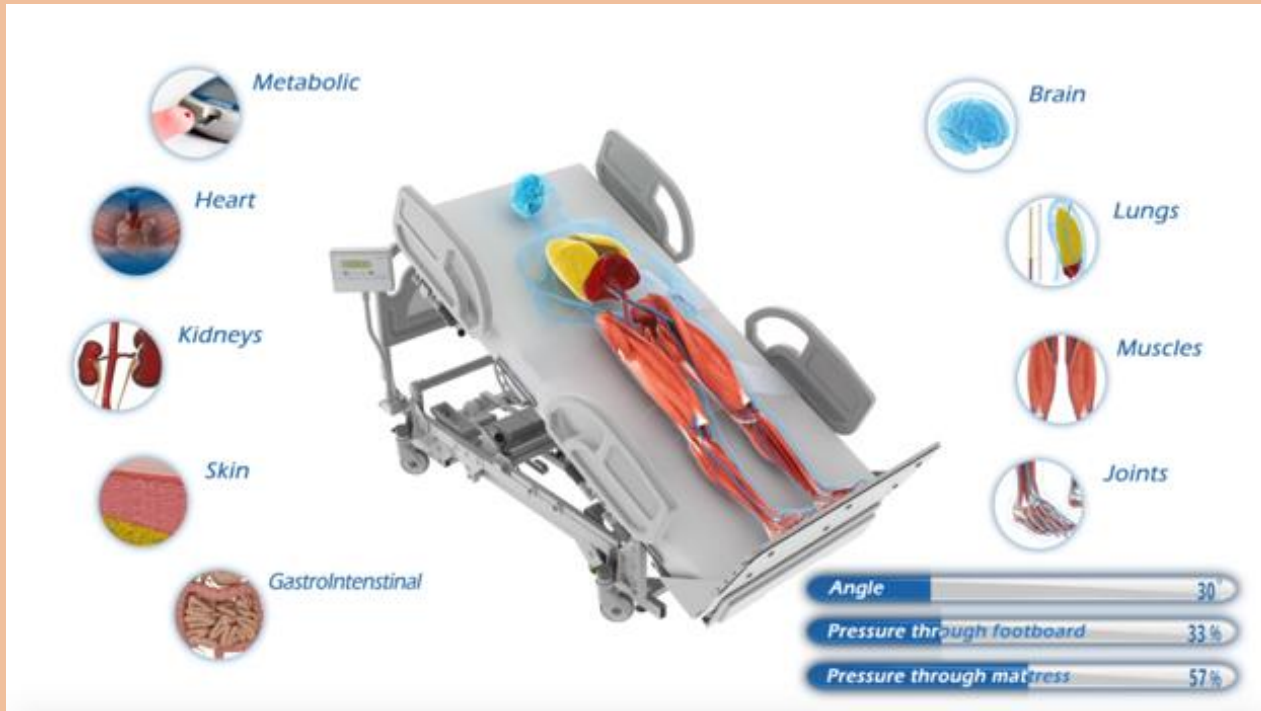
Objectives: By the end of this presentation, attendees will be able to:

1. Discuss current evidence-based best practices for Early Mobility
2. Describe the role of Respiratory Therapists in promoting a culture of Early Mobility
3. List 3 specific RTs interventions that can promote mobility in their patients





# ALL SYSTEMS AFFECTED



- Cardiac (decreased ability to deliver oxygen to the body)
- Respiratory (risk of pneumonia)
- Musculoskeletal (weakness, increase risk of falls and injury from a fall)
- Metabolic (high sugar levels and increased risk of skin breakdown)
- Skin (Increased risk of pressure injuries)
- Gastro-Intestinal (fecal impaction and inflammation)
- Neurological (poor balance, hypotension, risk for falls)
- Psychosocial (Anxiety, depression, fear, decreased motivation, despair)





# One Day Makes A Big Difference !!

DAY	1	2	3	4-5	6-7	8-10
<b>To-Do List</b> <input checked="" type="checkbox"/> Get Milk <input checked="" type="checkbox"/> Pick Up kids <input checked="" type="checkbox"/> Mobilize Patients	Contractures Begin 1* Muscle Atrophy Begins 1* Pressure Area Develops Plasma Volume ↓ 2* Orthostatic Hypotension begins to develop 2* Hypoxemia 2* Insulin Resistance ^ 3* Altered Triglyceride levels 4* ↑ CA+ in Urine ↑ 1*	Sarcopenia (loss of muscle strength) 1-3% per day 1,2* Dorsal Atelectasis begins Thoracic fluid volume ↑ 5* Loss of Calcium in Urine and ↑ Risk of Renal Calculi 40% chance of becoming incontinent if 65+ years 6* Peristalsis ↓ / Impaction	8-10% loss of plasma volume 1* Cardiac workload ↑ 1* HR (rest) ↑ 1* Stroke Volume ↓ 1* Cardiac Output ↓ 1* Lower Pain Threshold Anxiety and Fear Depressed Central Nervous System Responses	Risk of gastric aspiration and endotoxemia ↑ Microvascular Dysfunction 1* Visible weakness in 25-30% Mechanically Ventilated Patients 10-15% decrease in Muscle Strength 1*	1% bone mineralization lost per week 6* Bone degradation continues as long as bed rest occurs Risk of ventilator acquired pneumonia increases every day Risk of long term disabling weakness continue every day Risk for falls and delerium increases everyday	

1. DeJonghe B, Sharshar T, Lefaucher JP et al. Paresis acquired in the ICU. A Prospective Multi-Center Study. JAMA 2002; 288(22): 2859-2867 2. King L. Developing a Progressive Mobility Activity Protocol. Orthopedic Nursing 2012; (Sept/Oct) 3.1(5): 253-262 3. Casey C. The Study of Activity. An Integrative Review. Journal of Gerontological Nursing, 2013; 39(8). 4. Greenleaf JE. Physiology of prolonged bedrest. NASA Technical Memorandum, 101010.1988 5. Pavy-Le Traon A, Heer M, Narici MV, Rittweger J, Vernikos J. From Space to Earth: advances in human physiology from 20 years of bed rest studies (1986-2006). Eur J Appl Physiol 2007; 101(2): 143-194 6. Ray K, Boderham A, Paramasivam E. Pulmonary Atelectasis in Anesthesia and Critical Care. Continuing Education in Anaesthesia, Critical Care & Pain j 2014; 14(5): 236-245 7. Hamburg NM, McMackin CJ, Huang AL, Sherouda SM, et al. Physical Inactivity Rapidly induces insulin resistance and microvascular dysfunction in healthy volunteers. Arterioscler. Thromb. Vasc. Biol. 2007; 27:2650-2656 8. Peddie MC, Bone JL, Rehner NJ, Skeaff CM, Gray AR, & Perry TL. Breaking Prolonged sitting reduces postprandial glycemia I healthy normal-weight adults: a randomized crossover trial. Am J Clin Nutr 2013; 98:358-66 9. <http://www.ahrq.gov/research/HC/pressureulcer/kit/putool.htm> 10. Stuemfle KJ, & Drury DG. The Physiological Consequences of Bed rest. JEPOnline 2007; 10(3):32-41 11. Vollman K. Progressive Mobility in the Critically Ill. Critical Care Nurse, 2010; 30(2): S3-S4. 12. Winkelman C. Bed Rest In Health and Critical Illness. A Body Systems Approach. AACN Advanced Critical Care 20(3):254-266. 13. Knight J, et al. Effects of bedrest 1. Cardiovascular, respiratory, & hematological systems. Nursing Times 2009; 105(21). <https://www.pubfacts.com/detail/19548502/Effects-of-bedrest-1--cardiovascular-respiratory-and-haematological-systems> 14. Nigam Y, Knight J, & Jones A. The physiological effects of bed rest and immobility part 3- the musculoskeletal system, skin, and Immunity. Nursing Times 2009; 105(23):18-22 15. Shearer WT, Ochs HD, et al. Immune responses in adult female volunteers during the bed-rest model of spaceflight: Antibodies and cytokines. J Allergy Clin Immunol 2009; 123(4): 900-905 16. Anastasopoulos et al. Is plasma calcium concentration implicated in the development of critical illness polyneuropathy and myopathy? Critical Care 2011, 15:R247 <http://ccforum.com/content/15/5/R247> 17. Puthuchery ZA, Rawal J, McPhail M, Connolly B, et al. Acute skeletal muscle wasting in critical illness. JAMA 2013; 310(15):1591-1600. doi:10.1001/jama.2013.278481 18. Kortebein P, Ferrado A, Lombieda J, Wolfe R, & Evans J. Effect of 10 days of bedrest on skeletal muscle in healthy older adults. Journal of the American Medical Association, 2007. 297(16): 1772-1774. doi:10.1001/jama.297.16.1772-b.

# POST-INTENSIVE CARE SYNDROME (PICS)

- **Definition**

New or worsening physical or cognitive impairments after critical illness.

- **Impact on Patient**

Profound changes in Quality of Life, ability to fulfil social & job responsibilities for months or years after hospital discharge

- Physical
- Psychological
- Cognitive functioning

- **Impact on Family**

- Anxiety & altered relationships
- Economic changes
- 

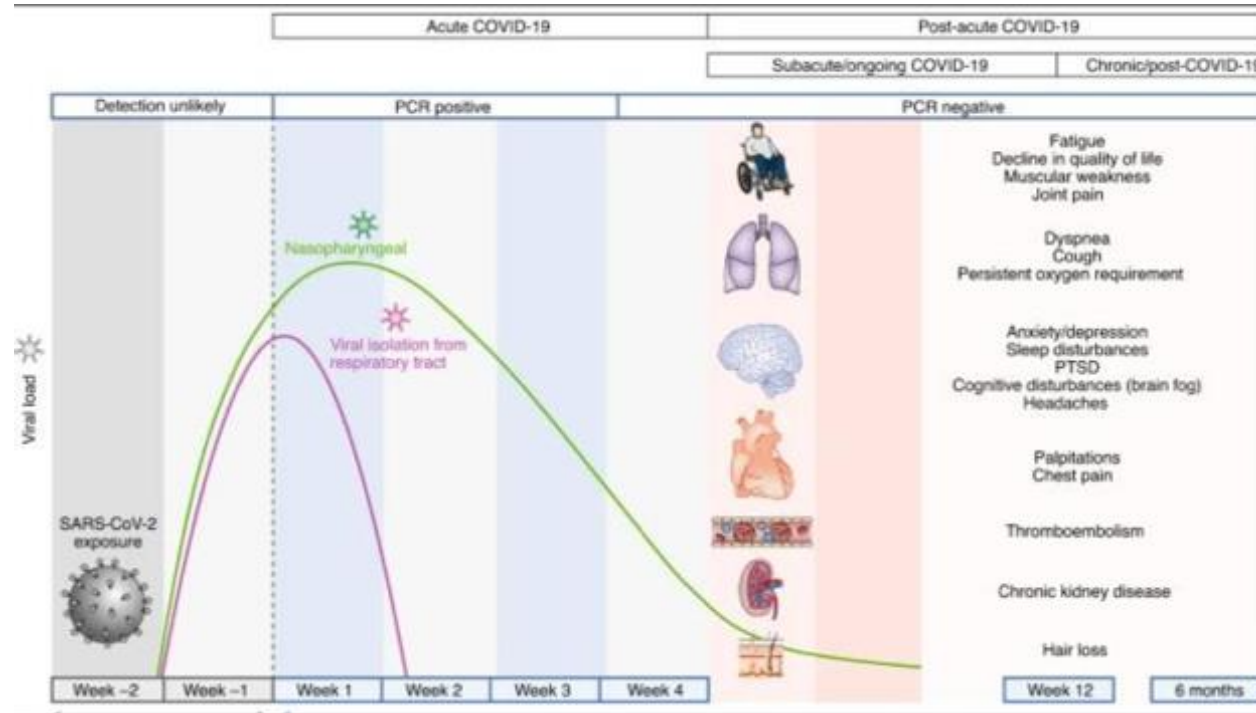
- **Causes**

- ICU-Acquired Weakness
- Cognitive impairment
- Delirium



# FINDINGS FROM REHAB CARE ALLIANCE, CANADA

<http://rehabcarealliance.ca/post-covid-19-condition>



# EVIDENCE: IMPACT OF IMMOBILITY

Physical inactivity 4th leading risk factor for global mortality accounting for 6% of deaths globally.

Active lifestyle decreases risk of cardiovascular disease, coronary heart disease and stroke by 25-30% cp to sedentary lifestyle and assoc. with decreased risk of diabetes, obesity, osteoporosis, colon/breast cancer and improved mental health.

- <https://fingertips.phe.org.uk/profile/physical-activity>

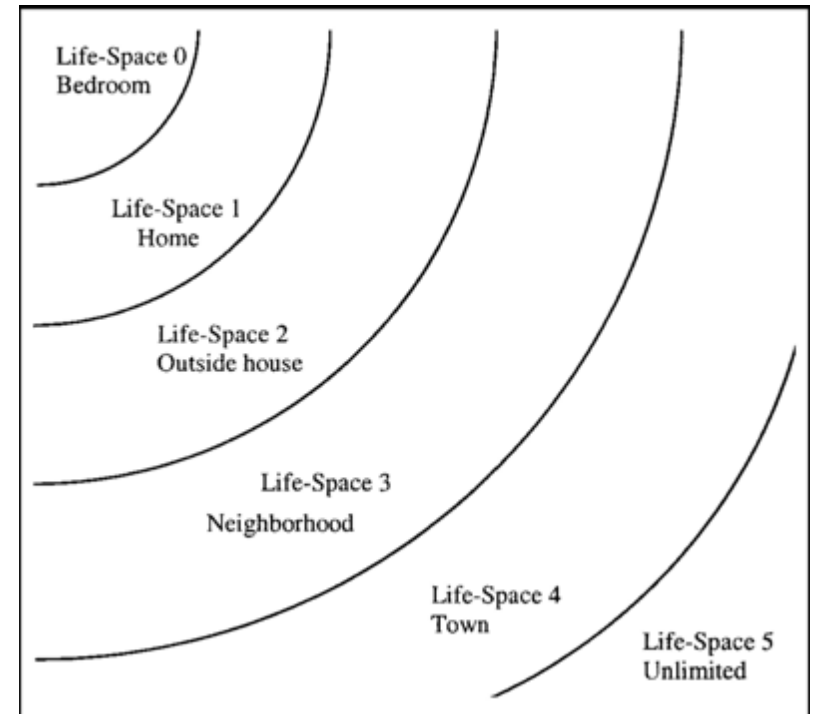


# IMPACT OF PATIENT IMMOBILITY

- Scoping Review (Smart, 2018) found that Immobility Syndrome increased frailty and functional decline
- Kaiser Permanente: Over 40% of patients >70 years old will develop incontinence within 1 day of hospitalization
- Patients spend over 80% of their time in bed in acute hospitals, and in wheelchairs in LTC (Brown 2009)

# EVIDENCE: HOSPITALIZATION-INDUCED IMMOBILITY REDUCES LIFE – SPACE MOBILITY SCORES

- Life-Space Mobility is a holistic measure of resilience and physical decline in the aging population
- Can be used to determine "Age-friendly" neighborhoods and impact of mobility interventions in the community population
  - Taylor, J. K., Buchan, I. E., & van der Veer, S. N. (2019). Assessing life-space mobility for a more holistic view on wellbeing in geriatric research and clinical practice. *Aging clinical and experimental research*, 31(4), 439–445. <https://doi.org/10.1007/s40520-018-0999-5>
- 2018 study of 173 hospitalized community-dwelling at Central Alabama, Birmingham Veterans Affairs Medical Center found 53% had clinically significant decrease in life-space mobility at discharge
- LSA scores decreased by 6.1 points for patients visiting ER and 18.0 points after hospitalization
- Neither group recovered to their prior level of community mobility at 6 months.
  - Loyd C, Beasley TM, Mlltner RS, Clark D, King B, Brown CJ. Trajectories of community mobility recovery after hospitalization in older adults. *Journal of the American geriatrics society*, 2018. 66(7):1241-1444.



# EVIDENCE: MODERATE TO HIGH INTENSITY EXERCISE IMPORTANT IN PRE-FRAIL POPULATION

- Frailty is a key predictor of Nursing Home Placement
- Exercise can help prevent or slow progression to pre-frail and frail
  - Kojima G. Frailty as a Predictor of Nursing Home Placement Among Community-Dwelling Older Adults: A Systematic Review and Meta-analysis. *J Geriatr Phys Ther.* 2018 Jan/Mar;41(1):42-48. doi: 10.1519/JPT.000000000000097. PMID: 27341327.
- Fall-preventive moderate intensity group-exercise programs decrease falling/ improve physical performance in pre-frail, but not in frail elderly – Intervene Early with Prevention
  - Faber MJ, Bosscher RJ, Chin A Paw MJ, van Wieringen PC. Effects of exercise programs on falls and mobility in frail and pre-frail older adults: A multicenter randomized controlled trial. *Arch Phys Med Rehabil.* 2006 Jul;87(7):885-96. doi: 10.1016/j.apmr.2006.04.005. PMID: 16813773

# ADLS AND IADLS DECLINE DUE TO HOSPITALIZATION-INDUCED IMMOBILITY

- 525 Israeli community-dwelling adults were followed at hospital discharge and 1 month after discharge
- 46% percent had declined in ADLs at discharge and 49% at follow-up; 57% had declined in IADLs at follow-up.
  - Zisberg A, Shadmi E, Sinoff G, Gur-Yaish N, Srulovici E, Admi H. Low mobility during hospitalization and functional decline in older adults. *J Am Geriatr Soc.* 2011 Feb;59(2):266-73. doi: 10.1111/j.1532-5415.2010.03276.x. PMID: 21314647.

# HOSPITALIZATION IS INDEPENDENTLY ASSOCIATED WITH INCREASED DISABILITY AND DECLINE IN COMMUNITY MOBILITY

- Each episode of hospitalization, regardless of the underlying medical condition, is independently associated with an increased risk of disability among older adults.
  - Brown CJ, Roth DL, Allman RM, Sawyer P, Ritchie CS, Roseman JM. Trajectories of life-space mobility after hospitalization. *Ann Intern Med.* 2009 Mar 17;150(6):372-8. doi: 10.7326/0003-4819-150-6-200903170-00005. PMID: 19293070; PMCID: PMC2802817.
- Risk of developing new or worsening disability, and reduced likelihood of recovery from disability, increased with hospitalization.
- Hospitalization associated with a clinically significant decline in community mobility.
  - Covinsky KE, Palmer RM, Fortinsky RH, Counsell SR, Stewart AL, Kresevic D, Burant CJ, Landefeld CS. Loss of independence in activities of daily living in older adults hospitalized with medical illnesses: increased vulnerability with age. *J Am Geriatr Soc.* 2003 Apr;51(4):451-8. doi: 10.1046/j.1532-

# PUN ET AL, 2019 (*CRIT CARE MED* 2019; 47:3–14)

- 15,226 adult ICU patients across 68 ICUs

**Measurements and Results:** With all ABCDEF elements:

- 70% less risk of Hospital death within 7 days
- 72% less likely to need mechanical ventilation
- 65% less likely to be in a Coma
- 40% less risk of Delirium
- 63% less likely to need physical restraints
- 46% less likely to be readmitted
- 64% more likely to be discharged home

# ZHANG ET AL, 2019

- Australian Systematic review; 23 RCTs comprising 2,308 critically ill patients:  
Patients who had Early Mobility:
- Were 60% LESS likely to have ICU-AW at hospital discharge
- Were more likely to be able to stand
- Had more ventilator-free days during hospitalization
- Walked further unassisted at hospital discharge
- Were more likely to be discharged home

# SYSTEMATIC REVIEWS EARLY MOBILITY

- Zang K, Chen B, Wang M, et al. The effect of early mobilization in critically ill patients: a meta-analysis. *Nurs Crit Care*. 2019. <https://doi.org/10.1111/nicc.12455>.
- Kayambu G, Boots R, Paratz J. Physical therapy for the critically ill in the ICU: a systematic review and meta-analysis. *Crit Care Med*. 2013;41:1543–54. <https://doi.org/10.1097/CCM.0b013e31827ca637>.
- Tipping CJ, Harrold M, Holland A, et al. The effects of active mobilisation and rehabilitation in ICU on mortality and function: a systematic review. *Intensive Care Med*. 2017;43:171–83. <https://doi.org/10.1007/s00134-016-4612-0>.
- Fuke R, Hifumi T, Kondo Y, et al. Early rehabilitation to prevent postintensive care syndrome in patients with critical illness: a systematic review and meta-analysis. *BMJ Open*. 2018;8:e019998. <https://doi.org/10.1136/bmjopen-2017-019998>.
- Okada Y, Unoki T, Matsuishi Y, et al. Early versus delayed mobilization for in-hospital mortality and health-related quality of life among critically ill patients: a systematic review and meta-analysis. *J Intensive Care*. 2019;7:57. <https://doi.org/10.1186/s40560-019-0413-1>.
- Castro-Avila AC, Serón P, Fan E, et al. Effect of early rehabilitation during intensive care unit stay on functional status: systematic review and meta-analysis. *PLoS ONE*. 2015;10:e0130722. <https://doi.org/10.1371/journal.pone.0130722>.
- Doiron K, Hoffmann T, Beller E. Early intervention (mobilization or active exercise) for critically ill adults in the intensive care unit. *Cochrane Datab Syst Rev*. 2018. <https://doi.org/10.1002/14651858.CD010754.pub2>.



**AMERICAN  
GERIATRIC  
SOCIETY:  
INCREASED FOCUS  
NEEDED ON  
MOBILITY AS  
OUTCOME FOR  
HOSPITALIZED  
OLDER ADULTS**

- AGS Quality and Performance Measurement Committee white paper supporting greater focus on mobility as an outcome for hospitalized older adults.
  - Text SI. J Am Geriatr Soc 67:11-16, 2019.
    - Wald HL, Ramaswamy R, Perskin MH, Roberts L, Bogaisky M, Suen W, Mikhailovich A; Quality and Performance Measurement Committee of the American Geriatrics Society. The Case for Mobility Assessment in Hospitalized Older Adults: American Geriatrics Society White Paper Executive Summary. J Am Geriatr Soc. 2019 Jan;67(1):11-16. doi: 10.1111/jgs.15595. Epub 2018 Oct 1. PMID: 30276809.

# SCCM 2018 PADIS GUIDELINES

- SCCM recommends early rehabilitation and mobility as part of the A-F bundle (Now termed ICU Liberation Bundle)
  - [https://journals.lww.com/ccmjournal/Fulltext/2018/09000/Executive\\_Summary\\_\\_\\_Clinical\\_Practice\\_Guidelines.21.aspx](https://journals.lww.com/ccmjournal/Fulltext/2018/09000/Executive_Summary___Clinical_Practice_Guidelines.21.aspx)



# EARLY MOBILITY IS EVERYONE'S JOB

The most successful teams include:



Once you have your team, you are ready to set goals.

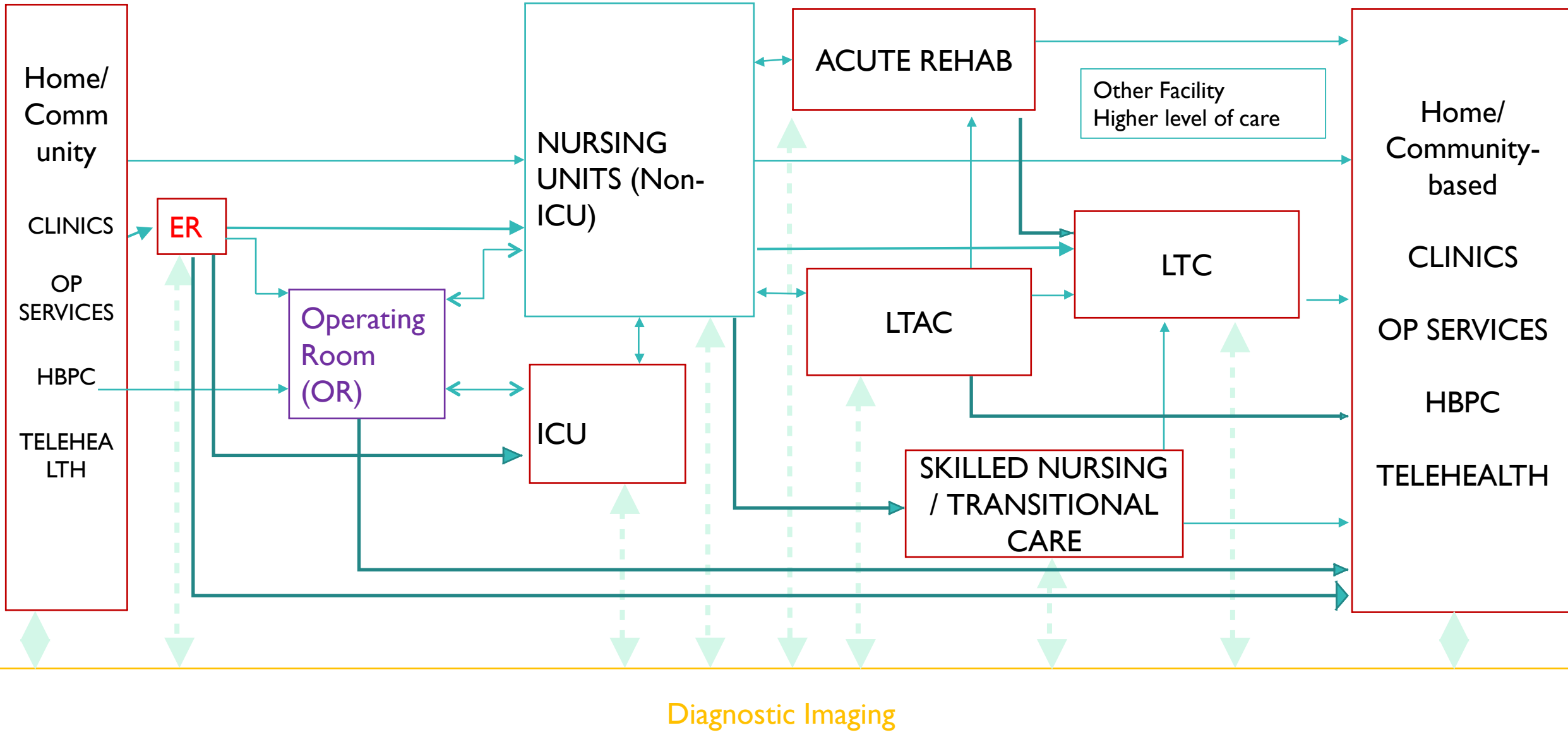
Download the EarlyMobility.com Data Collection Tool

To identify your

- Case Mgr
- HR/Union Reps
- Dietary

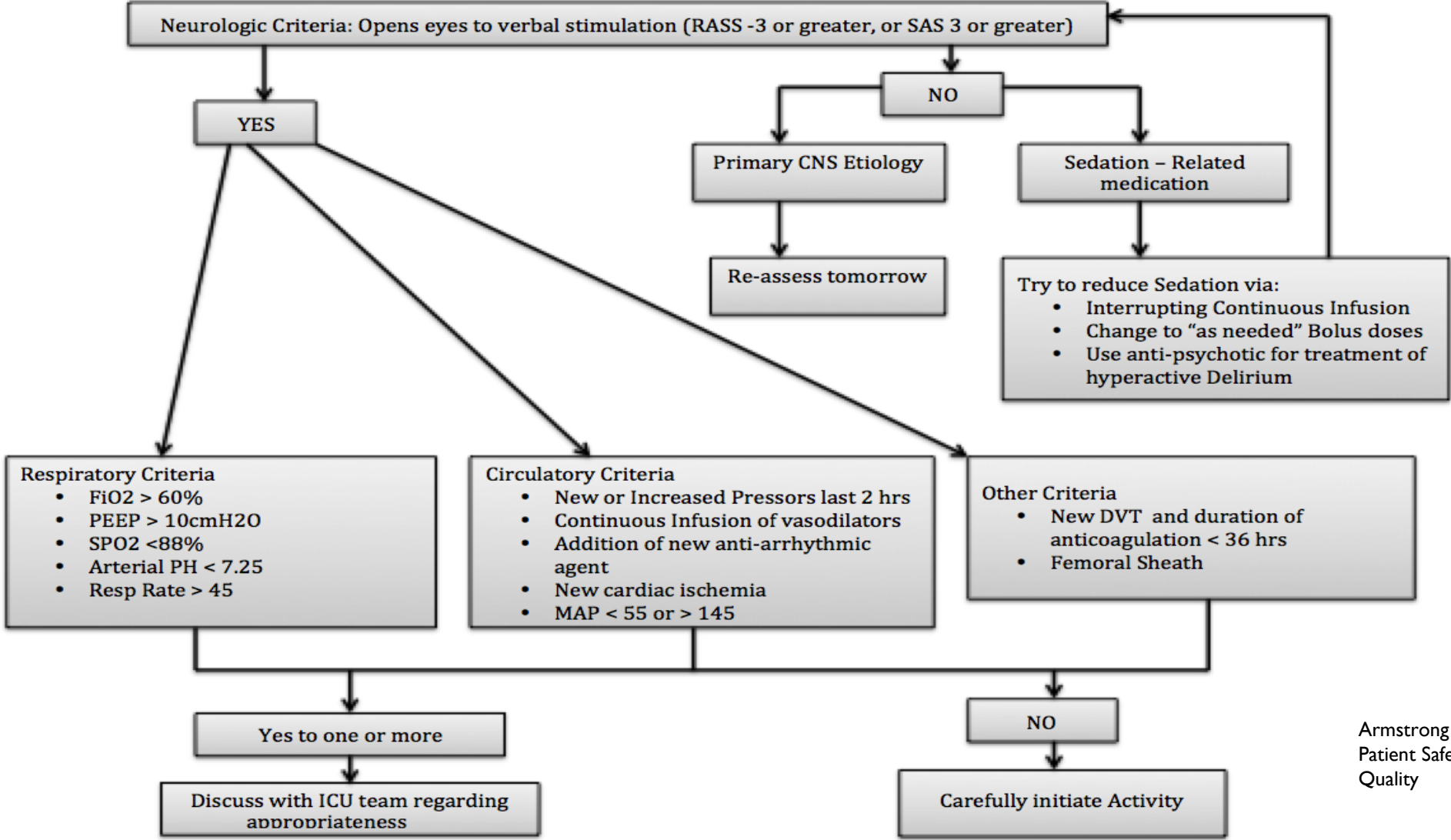


# Respiratory Therapy Role Across the Care Continuum for EM



# MEDICAL READINESS TO MOBILIZE

## Flowchart for Appropriateness for Mobilization



## RESPIRATORY THERAPY IN ICU



# ROLE OF RESPIRATORY THERAPIST

- Ventilator Support / ECMO : SCCM guidelines to increase O2 support for mobility
- Identifying patients who are appropriate for mobility
- Training other members of the team on ventilator settings and lines/tubes for mobility
- Promoting upright mobility for RT treatments wherever possible
- Working with team to promote a culture of mobility to help liberation efforts
- Coordinate with therapy and nursing to assist with mobility events
- Be knowledgeable in SPHM equipment that can help keep everyone safe during mobility
- Follow patients across care transitions to support and promote mobility as part of holistic wellness and recovery









# VIDEOS ON ICU MOBILITY WITH SPHM

VIDEO LINKS



ERFYL LLOYD DAVIES PHOTOGRAPHY

**THANK YOU!**



EarlyMobility.com

**QUESTIONS**

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