ICU Early Mobilization at UCSF

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Mobility is Life

- Early mobility is profoundly beneficial to your patients
- Don’t be afraid, they do better than you expect
- It is a MULTIDISCIPLINE task

Presentation Objectives

- Review of patient functional decline related to an ICU stay
- Define early ICU mobilization
- Outline steps necessary to increase mobility of ICU patients
- Cite evidence of benefits to patients, family members, and the medical center of early ICU mobilization.

Why Do ICU Patients Need Physical Therapy?

- Clinical Outcomes for Survivors of ARDS
  - At One Year (Median age 45, N= 83)
    - 48% returned to work
    - Results of 6 minute walk test are 66% of predicted normal
  - At Five Years (Median Age 44, N=64)
    - 77% returned to work
    - Results of 6 minute walk test are 76% of predicted normal

Can We Do Better?

- "There appears to be significant potential for harm arising from the current ICU culture of patient immobility and an often excessive or unnecessary use of sedation."


The Impact of an ICU Stay

- **ICU Acquired Weakness**
  - Rapid onset-
  - Pervasive weakness
  - Immobility myopathy – myosin filament atrophy and sarcomere collapse
  - Axonal polyneuropathy
  - Difficulty liberating from mechanical ventilator


Critical Illness Myopathy (CIM)

Critical Illness Polyneuropathy (CIP)


Critical Illness Myopathy

Impact of Mechanical Ventilation

- The combination of 18 to 69 hours of complete diaphragmatic inactivity and mechanical ventilation results in marked atrophy of human diaphragm myofibers

- Patients over 65 years of age surviving hospitalization with MV vs hospitalization without, experience 30% greater ADL disability

Post Intensive Care Syndrome (PICS)

- Delirium
  - ”Although estimates differ, it appears that at least 1 in 3 survivors of critical illness will experience long-term cognitive impairment of a severity consistent with mild to moderate dementia.”
  - www.indelirium.org, US Department of Veterans Affairs

- Post Traumatic Stress Disorder (PTSD)
  - Risk Factors- pre-ICU anxiety or psychological history, length of mechanical ventilation required, type of sedation used

Cognitive Changes Related to ICU Stay

- 25 to 40% of patients with new onset cognitive changes
  - Impaired learning and short term memory
  - Executive function
  - Attention

- Contributing factors
  - Hypoxemia
  - Variable glucose control
  - Delirium
  - Sepsis


Functional Decline Related to ICU Stay

- Acute Problems-
  - Patients from the ICU fall 3 times as often during hospitalization
  - Adults with ICU Acquired Weakness on > 5 days Mechanical Ventilation-
    - require longer MV
    - longer hospital stay
    - independently associated with hospital mortality.

Functional Decline Related to ICU Stay

- **Long Term Problem**
  - 3.3 year median follow up after d/c from trauma ICU 100 patients
  - 70% consider themselves less active than pre-injury
  - 49% returned to work.


- More than 6 years after a surgical ICU admission, HRQOL is largely reduced. Many patients still have a variety of health problems, including decreased cognitive functioning.


Mobility is Medicine

- **Health Benefits of Physical Activity**
  - Improves blood sugar homeostasis
  - Enhances cardiovascular function
  - Enhances endothelial function
  - Decreases chronic inflammation
  - Regulates hormone levels
  - Preserves musculoskeletal and neuromuscular integrity
  - Decreases depression and improves cognition


Definition of Early ICU Mobilization

- “Early” defined as initial physiologic stabilization, continuing throughout ICU stay

- Initiating patient mobilization within 48 hours of patient admission to the ICU through:
  - ICU cultural shift toward mobility as necessity, not optional
  - Practice patterns of all ICU personnel emphasizing team work with mobilization
  - Optimizing the ICU environment to allow for patient mobility
    - Equipment
    - Sleep
    - Sedation

- Bailey PPR, ACNP; Miller, Russell R. MD, MPH; Clemmer, Terry P. Culture of Early mobilization in mechanically ventilated patients. Critical Care Medicine. 2006;34(9):1805-1815.

ICU Early Mobilization Requires

- Admit to ICU with activity as tolerated orders
- Physical Therapy referrals are included in MD orders
- 60-80% of ICU patients receive consistent Physical Therapy daily
- Patients are awake
- Work of breathing is minimized
Steps Taken at UCSF-9 ICU

- Research
- Promotion
- Role models
  - UCSF 10 ICU/ICC
  - Johns Hopkins Hospital
  - LDS Medical Center
- Create multi-discipline team
- Add staffing and equipment

Research


- RCT-104 patients on mechanical ventilation
  - Intervention group- PT median of 1.5 days intubation
  - Control group- PT median of 7.4 days
- Intervention group-
  - Less days of delirium and MV
  - 59% return to independent function at hospital discharge
  - 35% in control group

Promotion

- Staff meeting in-services
- Visiting consultants
- RN Newsletter
- Critical care grand rounds
- CEO office hours
- E-mail updates
- Multi-discipline meetings
- Community bulletin board
- Sedation education
- Sleep and thirst studies

Research


- Retrospective Survey of 280 Acute respiratory failure survivors
- Factors associated with readmissions or death during the first year-
  - Tracheostomy
  - Female gender
  - Higher Charlson Comorbidity Index
  - Lack of early ICU mobility
Role Models - LDS Medical Center

- LDS Medical Center Mobility Protocol
- Walk 200’ prior to extubation
- Walk 400’ prior to ICU discharge
  - When patients appear not to have strength to do both reconditioning and weaning, support reconditioning first, then weaning.
  - Support work of breathing during physical activity.
  - Advance activity aggressively NOT progressively, patients will do the most that they can do at any given time.

\[ V_t = 450 \text{ mL}, \ PEEP = 16, \ Fio_2 = 0.6 \]
Role Models- Johns Hopkins


- There are barriers to providing early physical medicine and rehabilitation (PM&R) in the intensive care unit (ICU). Johns Hopkins Hospital presents a model for quality improvement (QI) projects.

- The QI project was undertaken using a 4-step model:
  1. Summarizing the evidence
  2. Identifying barriers
  3. Establishing performance measures
  4. Ensuring patients receive the intervention

Role Models- UCSF 10 ICU/ICC

- Mobilizing ECLS patients- centrally cannulated. Sternotomy with cannula in R atrium (inflow) to aorta (anastomosed). Both cannula tunneled out and connected to circuit.

- ECLS patients regularly got out of bed and walked over to chair. Spent several hours per day out of bed.

Adult ExtraCorporeal Life Support (ECLS)

- VV Cannulation via the Double Lumen Cannula
Staffing and Equipment

- UCSF - one full time PT added
- No additional RN or RT staff
- ICU platform walker, ear plugs, eye masks, seating cushions
- PTs mobilize patients to higher level than RNs


MOTOR-Medo Letto
- Deconditioned, too weak for OOB
- Medically fragile
- Femoral dialysis catheters, mechanical ventilation
- Aerobic work

Barriers to Initiating Early Mobilization

- Sounds like a good idea, but:
  - I cannot add staff at this time
  - It’s too much work
  - It’s not safe
  - The evidence is not conclusive enough
  - Verbal support without concrete follow up
  - Skeptical managers and Medicine clinicians
  - Practice patterns, protocols, communication, and documentation systems must be changed
  - Endless meetings, no start date

ICU Early Mobilization Started March 1st, 2010 UCSF 9 ICU

- Physical Therapy coverage 8 hours/day 5 days/week in 9 ICU
- Objective - referrals for physical therapy within 48 hours of patient admission to the ICU
- Objective - most ICU patients ambulating during their ICU stay
- Goals -
  - Patients wean ventilators faster
  - Sleep better/experience less delirium
  - Leave the ICU sooner
UCSF Exclusion Guidelines

- Patients with immediate plans to transfer to outside hospital
- Patients who require significant doses of vasopressors for hemodynamic stability (maintain MAP> 60)
- Mechanically ventilated patients who require FiO2 .8 and/or PEEP >12, or have acutely worsening respiratory failure
- Patients maintained on neuromuscular paralytics
- Patients in an acute neurological event (CVA, SAH, ICH) with re-assessment for mobility every 24 hours
- Patients unresponsive to verbal stimuli
- Patients with unstable spine or extremity fractures
- Patients with a grave prognosis- transferring to comfort care
- Patients with a femoral dialysis catheter
- Patients with open abdomen, at risk for dehiscence

UCSF Inclusion Guidelines

- Patient is arousable to voice and requires skilled physical therapy intervention- PT referral written by MD or NP
- PT and NP will informally round on the 9 ICU patient census daily to select appropriate patients for new Physical Therapy referrals
- Functionally independent patients mobilize and ambulate with RN assistance
- All mechanically ventilated patients will be assessed by RT and assisted by both RT and PT at time of mobilization
- All patients ambulating in ICU will have portable telemetry set up by PT or RN

Barriers to Implementation- “It’s Not a Strength Issue.”

- Nervous or skeptical clinicians
- Minimal resources allocated
- Awkward equipment
- PT referrals still too late
- Unclear protocol
- PT in the ICU now a moderate priority rather than a last priority, but not a top priority
- Mobility prior to extubation is difficult concept for all
- Constantly rotating and changing personnel
- Variations in sedation practices
- New hospital and discharge course predictions required for ICU and floor personnel

UCSF ICU- step 1, untangling
UCSF ICU- step 2, bed exercise

UCSF ICU- step 3, sitting on EOB

UCSF ICU- step 4, assisted sit to stand

UCSF ICU- step 5, walking
UCSF ICU - step 6, sit and rest as needed

Benefits to UCSF - ICU Early mobilization
Patient lines and drains can be accommodated

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Benefits to UCSF - ICU Early mobilization
Tremendous positive feedback from family members
Benefits to UCSF- ICU Early mobilization
Less stress experienced by family and patients

UCSF Experience of ICU Early Mobilization

- The Message: preventing deconditioning is just as important as preventing skin breakdown, VAP, line infections
- Safety: adverse events- rectal tubes, peripheral IV access and NG tubes dislodged
- Safety: no central lines, catheters, or ET tubes dislodged
- Safety: no falls, syncope episodes or cardiac events during mobility with PT

UCSF Experience of ICU Early Mobilization

- Two planned tracheotomies avoided
- Decreased length of stay
- Patients able to go home instead of to SNF

UCSF Experience of ICU Early Mobilization

13 ICU- standard PT care
- 51 yo M ARDS pt, I community level activity
- 50meg propofol PEEP 8 FiO2.6
- Bed rest activity orders, PT referral on HD 10
- Failed SBT, delirium
- LOS 1 month, 5 sessions PT
- d/c’d to acute care able to stand 30 seconds with minA of 2

9 ICU- early mobilization
- 25 yo F ARDS pt, I community level activity
- 100meg propofol PEEP 16 FiO2.9
- Activity as tolerated orders, PT referral on HD 1
- ICUAW, tracheotomy
- LOS 1 month, 19 sessions PT
- d/c’d to acute rehab able to walk SBA FWW 60’ X4
**UCSF Experience of ICU Early Mobilization**

**Improvements in discharge outcome correlate to**
- Earlier mobility
- More intense intervention
- Greater distance walked

**ICU Patients Receiving Physical Therapy**

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<tbody>
<tr>
<td># of PT patients, Average # PT visits</td>
<td>220 patients, 5 visits 33 patients intubated</td>
<td>397 patients, 5 visits 53 intubated</td>
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<tr>
<td>Assist level scores</td>
<td>Min A on average</td>
<td>Mod A on average</td>
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<tr>
<td>overall # of PT patients in ICU walking</td>
<td>77 patients walking</td>
<td>148 patients walking</td>
</tr>
<tr>
<td>Average distance walked</td>
<td>87 feet</td>
<td>147 feet</td>
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<tr>
<td>Average length of hospital stay</td>
<td>24 days 10 days in ICU</td>
<td>19 days 8 days in ICU</td>
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<tr>
<td>% of PT patients walking in ICU d/c to home</td>
<td>55% d/c from UCSF to home</td>
<td>71% d/c from UCSF to home</td>
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**Future for ICU Early Mobilization at UCSF**

- Continue ICU Multi-discipline meetings to develop greater cross discipline collaboration, physical therapy students utilized
- Continue data collection for QI and research purposes emphasizing outcomes rather than tasks
- Case study review by all disciplines and write up
- Sedation and sleep education campaign
- Diaries project
- Use of clinical frailty scores, frailty index, mobility scores*


**Surgical Optimal Mobility Score (SOMS)**

- 113 patients studied in a single center prospective cohort
- Roughly ½ patients on pressors, 1/3 on mechanical ventilators
- SOMS assessed by RNs day 1 of ICU admission to SICU independently predicted
- In hospital mortality
- SICU and total hospital length of stay

Future for ICU Early Mobilization at UCSF

- Questions to answer
  - Are we comfortable with mobilizing patients on vasopressors, with femoral lines, with agitation?
  - How do we coordinate ventilation, sedation, spontaneous breathing trials, and extubation with mobilization?
  - How do we take into account functional mobility, endurance, and physiologic reserve of the patient?

The Ounce of Prevention Reward

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