Keys to Successful Mobility in the ICU

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To be conscious that you are ignorant of the facts is a great step to knowledge.

Benjamin Disraeli
What are the facts?

“Survivors of the acute respiratory distress syndrome have persistent functional disability one year after discharge from the ICU. Most patients have extrapulmonary conditions, with muscle wasting and weakness being most prominent.”

Herridge, Margaret etal One-year Outcomes in Survivors of the Acute Respiratory Distress Syndrome” N Engl J Med. 2003 348:8
What are the facts?

“Studies suggest that ARDS survivors may indeed have reduced quality of life. There are also data suggesting survivors may be at increased risk of death for many months after hospital discharge...this in the face of improved provision of advanced technologic support in the modern day ICU.”

Derek Angus et.al. Quality-adjusted survival in the first year after ARDS Am J Respiratory Crit. Care Med. 2001
Study Data

“One-year outcomes in survivors of ARDS”

- 109 survivors of ARDS
- Evaluated at 3, 6 and 12 months post discharge

Margaret S. Herridge et al.
NEJM February 2003
Study Data

- Median data
  - 47 years of age (36-58)
  - APACHE II- 23 (17-27)
  - Vent days 21 (12-40)
  - ICU LOS 25 days (15-45)
Results

- Patients had lost 18% of their base-line body weight at discharge from the ICU.
- Muscle wasting and fatigue were primary factors in functional limitations.
- Lung volume and spirometric measurements were normal by 6 months post discharge.
- No patient required supplemental oxygen at 12 months.
Results

- Only 49% were working at 12 months
  - Persistent weakness and fatigue
  - Poor functional status as result of foot drop and immobility of large joints
Why?

- Use of corticosteroids:
  - main determinant at 3 months - gone by 6 months

- Complications of critical illness acquired during the ICU stay

- Rate of illness resolution
Why?

Changes in the nerves, muscles and neuromuscular junction

- Polyneuropathy of critical illness
- Atrophy or disuse myopathy resulting from prolonged use of sedation and paralytic agents
Impacting the Outcome

Improving Care for ARDS patients

Sedation  
Sleep  
Mobility  
Delirium
Vt = 450 mL, PEEP = 16, Fio₂ = 0.6

Figure 1. A patient with exacerbation of chronic obstructive pulmonary disease and pneumonia on assist-control ventilation ambulating with the aid of the respiratory therapist on the right, physical therapist on the left, and a critical care technician following with a wheelchair in the background. The patient's nurse is outside of the photograph. Printed with permission.
Patients Qualifying for Mobility: Traditional View

Patients who “cannot possibly participate”:

- Medical directive for bed rest (e.g. unstable spine)
- Coma
- Severe Hemodynamic Instability
- Modest hemodynamic instability
- High FiO₂/PEEP
- Delirium
- CVVHD
- Stroke
- Critical illness polyneuropathy
Patients Qualifying for Mobility: “New” View

Patients who cannot possibly participate:

- Medical directive for bedrest (e.g. unstable spine)
- Coma
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- Modest hemodynamic instability
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These patients are inconvenient, but not impossible.

Figure 3. Airway status during activity. Type of activity (sit on the edge of the bed, sit in a chair, and ambulate) is shown for patients with an endotracheal (ET) tube.
Bailey P, et al  Early activity is feasible and safe in respiratory failure patients.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total Group (n = 85)</th>
<th>Age &lt;65 Yrs (n = 49)</th>
<th>Age ≥65 Yrs (n = 36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No activity</td>
<td>2 (2.4)</td>
<td>0</td>
<td>2 (5.6)</td>
</tr>
<tr>
<td>Sit on bed</td>
<td>4 (4.7)</td>
<td>2 (4.1)</td>
<td>2 (5.6)</td>
</tr>
<tr>
<td>Sit in chair</td>
<td>13 (15.3)</td>
<td>5 (10.2)</td>
<td>8 (22.2)</td>
</tr>
<tr>
<td>Ambulate ≤100 feet</td>
<td>7 (8.2)</td>
<td>6 (12.2)</td>
<td>1 (2.8)</td>
</tr>
<tr>
<td>Ambulate &gt;100 feet</td>
<td>59 (69.4)</td>
<td>36 (73.5)</td>
<td>23 (63.8)</td>
</tr>
</tbody>
</table>

Data are subdivided by age <65 years and age ≥65 years. Values are n (%).
Bailey P, et al  Early activity is feasible and safe in respiratory failure patients.

• 9 patients had adverse events, 4 of whom were >65 yrs of age.

• Adverse events occurred in 14 of 1,449 (0.96%, $10^{-2}$) activity events.
Adverse Events Included:

1. Five falls to the knees without injury,
2. Four systolic blood pressure <90
3. Three oxygen desaturation <80%,
4. One nasal-small bowel feeding tube removal, and
5. One systolic blood pressure >200
Adverse Events Did Not Include

1. Endotracheal Extubation,

2. Complications That Required Additional Therapy,

3. Additional Cost, or

4. Longer Length of Hospital Stays
Meta Rules

1. It is difficult to recondition a patient that is obtunded due to over sedation or use of narcotics.
   - minimize sedative and narcotic use by incorporating agents with minimal CNS and respiratory depression.

2. It is difficult to recondition a patient that has excessive breathlessness or becomes hypoxic during activity.
   - Support work of breathing during and prevent desaturation during physical activity.
Meta Rules

3. Patients should not refuse activity any more than they could refuse an antibiotics or other important intervention.

4. Activity should be progressed aggressively.

5. Activity may be suspended for 24 hours if the patient has an acute unstable event.

6. When patients appear not to have the strength to do both reconditioning and weaning, support their reconditioning first, then the weaning. Physical strengthening will help to overcome weaning difficulties.
Mobility Goals

- Walk 100 ft. prior to extubation (patients can be walked with vasopressors at moderate to low doses)
- Walk 200 ft. prior to discharge from ICU
- Transfers independently or with minimal assistance.
- Suspension of activity should be limited to 24 hours and reevaluated each day during rounds until activity is restarted.
Begin Activity

1. Patient responds to verbal stimuli with eye opening. Do not wait for them to become alert, follow commands, or be interactive. Often patients who appear unable to participate will tolerate activity and improve neuro status.

2. FIO2 is less than or equal to .60 and PEEP is less than or equal to 10. Mobility can often be initiated successfully at higher levels of FIO2 and PEEP with minimal desaturation events.
Begin Activity

3. Agitation and delirium are not exclusion for activity and will often improve once conditioning improves.
Prevent desaturation during activity:

1. Increase patients FIO2 by 0.2 before beginning activity if desaturation is anticipated.

2. Monitor oxygen saturation during and after activity.

3. If patient:
   - is on pressure support/CPAP place them on A/C during activity
   - can ambulate and is intubated – ventilate with a 100% bag during activity.
   - can ambulate and is post extubation they should be monitored with oximetry to keep SaO2>90%
Prevent desaturation during activity:

4. If patient has excessive dyspnea
   - Avoid suspending activity due to breathlessness and dyspnea by allowing the patient to pause and rest at short intervals
   - For extremely deconditioned patients on MV try giving a short rest on A/C about 30 minutes prior to and 30 minutes after their exercise.
Progress activity as follows

1. Dangle patients with assistance. Sit patient on the bed with legs over the edge and touching the floor (if possible). Support the torso until the patient can sit independently.

2. Stand patient at bedside with support. Begin weight bearing on one or two legs.

3. Transfer to chair by pivot or taking one or two small steps.
Progress activity as follows

4. Walk with assistance. May use a walker or physical support of an individual (PT). Always have a wheelchair following behind in case the patient becomes exhausted and/or breathless and needs to suspend activity.

5. Walk Independently 200 feet before discharge
First step is to dangle
The Dance
Heavy-Sedation Is Harmful!

1. Predisposes to VAP by
   a. Inhibiting Coughing
   b. Inhibiting Mobilization of the Patient
   c. Decreasing Immune Function
   d. Promoting Aspiration

2. Accelerates patient deconditioning

3. Prolongs time on ventilators

4. Promotes skin breakdown

5. Most likely promotes post ICU-PTSD
Awake and Cooperative Is The Goal

1. Reflexes return
   a. Cough, sigh, deglutition.

2. Mobility starts

3. Ventilator time is reduced

4. Reduces skin problems

5. Reduces long term psychological problems
Stoppers - Unjustified Fears

- Patient will harm self if not heavily sedated
- Better if patient does not remember this experience
- Care will be compromised if patient is not controlled and moves around
SEDATION METARULES

1. Set “necessity criteria for sedation”. Provider’s FEAR is not a just reason

2. Titrate to a sedation score to avoid over sedating patient

3. Remove sedation at least once a day to make sure patient still requires sedation

4. Leave sedation off until patient meets the “necessity criteria for sedation”.

5. After sedation interruption restart sedation at a fraction of the prior dose (½ or ¾)
Scoring Tools

- Pain Scales --------------- Verbal, FLACC
  - Face, Legs, Activity, Cry, Consolability

- Agitation ------------------ MAAS, SAS, RASS
  - Motor Activity Assessment Scale
  - Sedation-Agitation Scale
  - Richmond Agitation and Sedation Score

- Delirium --------------------- CAM-ICU Score
  - Confusion Assessment Method for the Intensive Care Unit

- ETOH Withdrawal ---- CIWA
  - Clinical Institute Withdrawal Assessment

- Anxiety ---------------------- GAD 7
  - General Anxiety Disorder Score

- Sleep
Eligibility for Daily Sedation

1. All Ventilated Patients Receiving IV Drip Sedation (Fentanyl, Propofol, Midazolam, or Lorazepam) and
2. Have a GCS of < 13 or
3. Who Retain CO₂ When the Ventilator Support Is Reduced.
Exceptions to Daily Sedation Vacation:

1. Open abdominal wound in which fascia is not closed unless okayed by surgeon.

2. Intracranial pressure > 20 unless okayed by a physician.

3. Severe $o_2$ desaturation while on $fio_2 \geq 90\%$ unless ordered by a physician.
Procedure for Daily Vacation

From Fentanyl:

1. If Patient Has Significant Pain Make Sure Analgesia Is Ordered. Enteral Route Preferred
2. Stop the Fentanyl Drip
3. If Patient Becomes Agitated or Delirious and Needs to Return to IV Drip, Give a 50-100 Microgram Bolus of Fentanyl and Restart the Drip at ½ the Rate.
4. Titrate the Rate As Necessary to Obtain a MAAS Score of 2-3
Procedure for Daily Vacation
From Propofol:

1. If patient has significant pain, make sure an analgesic is ordered
2. Reduce Propofol rate in half.
3. If after 30 minutes patient is still not overly agitated or delirious stop the propofol drip.
4. If patient becomes agitated or delirious after reducing or stopping the drip give a bolus of propofol as needed
5. Resume titration at ½ the last rate to a level that results in a MAAS score of 2-3.
Procedure for daily vacation from benzodiazepines:

1. If Patient Has Significant Pain Make Sure Patient Has Analgesia Ordered.

2. Stop the Benzodiazepines Drip

3. If Patient Becomes Agitated or Delirious and Needs to Return to IV Drip, Give Small Bolus of Benzodiazepines and Restart the Drip at \( \frac{1}{2} \) the Rate.

4. Titrate the Rate As Necessary to Obtain a MAAS Score of 2-3
If Patient Fails a Daily Vacation Trial
Try a New Strategy:

1. If patient is delirious or severely agitated a trial of quetiapine fumarate (Seroquel®), olanzapine (Zyprexa®), or haloperidol (Haldol®) can be tried

2. If patient is very anxious, try clonazepam (Klonopin®) or low dose lorazepam (Ativan®)

3. If patient very restless, try valporic acid (Depacon®)
Clarify the Reason for Sedation Need and Severity of Problem

- Pain
- Agitation
- Delirium
- ETOH Withdrawal
- Anxiety
- Sleep Deprivation
Therapy for These Disorders

1. Pain -------------------- Analgesics
2. Agitation --------------- Valporic Acid
3. Delirium --------------- Atypical Antipsychotics
4. ETOH Withdrawal - Low Dose Benzodiazepines
5. Anxiety --------------- Low Dose Benzodiazepines
6. Sleep ------------------ Trazodone and/or Zolpidem
Analgesia
Goal: Tolerable pain relief with minimal sedation

- Use enteral route whenever possible
- Scheduled versus prn
- Intermittent parenteral versus continuous
- Selection of narcotic agents
  - Long acting versus short acting
  - Side effects (BP, HR, renal function, CNS)
- Alternative to narcotic agents
Agitation
Goal: Calm with Minimal Sedation

- **Valporic Acid**
  - Comes both Parenteral and Enteral Forms
  - Use smaller doses than for Anti-convulsant or Anti-psychotic indications (250 mg – 1000mg daily in divided doses)
  - Contraindicated in Liver Failure

- **Benzodiazepine**
  - Lorazepam 1 mg PRN not to exceed 4 mg per day
  - Clonazepam 0.5 – 1 mg daily
Delirium

Goal: Non-delirious with minimal sedation

- **Quetiapine Fumarate** (Seroquel)
  - Enteral Administration Only
  - 50 to 100 mg enterally once or twice per day

- **Olanzapine** (Zyprexa)
  - Enteral, Sublingual, IM Administration
  - 5 to 10 mg bid

- **Haloperidol** (Haldol)

- **Low Dose Lorazepam for ETOH Withdrawal**
Anxiety
Goal: Non-anxious with Minimal Sedation

- **Benzodiazepine**
  - Clonazepam 0.5 – 1 mg daily
    - Only Available in Enteral Form
  - Lorazepam 0.5 - 1 mg PRN not to exceed 4 mg per day
Sleep

goal: rested for daily activity

1. Control the night time environment
   a. Interruptions, noise, lighting

2. Increase daytime activities
   a. Dangling, standing by bed, transfer to chair, sitting in chair, walking

3. Sedation
   a. Trazodone 100 mg at 8 PM. May repeat at 10 PM as needed
   b. Zolpidem 5 mg at 8 PM
Tao te Ching # 65

The ancient masters didn’t try to educate the people, but taught them to not know.

When they think they know the answers, people are difficult to guide.

When they know that they don’t know, people can find their own way.

Lao-Tzu ~~ 500 BC
Leadership

Leaders can inspire or demoralize others first by how effectively they manage their own energy and next by how well they mobilize, focus, invest and renew the collective energy of those they lead. As a leader you MUST be fully engaged in the process!