Walk, don’t Run: Strategies for Mobilizing the ICU Patient

Welcome…
Thanks for Attending

- Disclosures
  - Kathleen Vollman
- Hill-Rom speakers
  - Bureau & consultant

Please turn your cell phone on vibrate or off

UNDERSTANDING THE IMPACT OF A STATIONARY SUPINE POSITION

Ventilation

Major Factors Influencing Distribution of Ventilation

- Gravity/weight of the lung
- Compliance/airway resistance
- Heterogeneous lung disease

Air Goes To Area of Least Resistance
**Supine Position:**

- Distribution becomes more uniform from apex to base
- Dependent lung ventilation > non-dependent
- Reduction in FRC

Amis et al. Respiratory Physiology 1984 56;145  
Kaneko et al. J of Applied Physiology 1966 21;767

**Reduction in FRC in the Supine Position**

- Influence of the abdominal contents on the diaphragm
- Position of the heart and relationship of the supporting structures to the lung and its influence on pleural pressure gradients


Differences in FRC Based on Position

<table>
<thead>
<tr>
<th>Position</th>
<th>FRC Change</th>
<th>Mean Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting to Supine Position</td>
<td>30%</td>
<td>800 ml</td>
</tr>
<tr>
<td>Sitting to Lateral Position</td>
<td>15-20%</td>
<td>450 ml</td>
</tr>
<tr>
<td>Sitting to Prone Position</td>
<td>15-20%</td>
<td>450 ml</td>
</tr>
</tbody>
</table>

Factors Influencing Regional Distribution of Perfusion

- Cardiac output
- Pulmonary vascular resistance
- Gravity/body position

Distribution of Perfusion

Upright Position:
Blood flow decreases as it moves from base to apex with virtually little or no flow at the apices

Blood Flow Changes with Position

- **Supine position**: Distribution becomes more uniform. Zone 3 maintained throughout the lung. Greater vertical perfusion gradient.
- **Lateral position**: Similar to supine except lung transforms to zone 2 approximately 18 cm above the most dependent part of the chest.
- **Prone position**: Zone 3 maintain throughout the lung. Reduced gravitational flow noted

Is Every Two Hours Enough?
“Minimal Physiologic Mobility Requirement”
Move Every 11 Minutes During Sleep


1990’s CLRT Research
Methodology
- 12 adult healthy baboons were randomized to CLRT or control for 11 days
- Mechanically ventilated, paralyzed and sedated and received normal supportive therapy
- Measured x-ray results, cultures, bronchoalveolar lavage, oxygenation indices, pulmonary function and lung volumes

Anzueto A et al Crit Care Med 1997;25(9):1560-1564

1990’s CLRT Research
Results
- No significant difference in hemodynamics, gas exchange or pulmonary function
- Day 7 the control group showed patchy atelectasis
- Day 11 two animals showed persistent radiological abnormalities. Bronchoalveolar lavage day 7 and 11 revealed significant increase in neutrophils
- Lung pathology in control group showed areas of bronchiolitis with 5 of 7 of the control animals demonstrating surrounding bronchopneumonia

Anzueto A et al Crit Care Med 1997;25(9):1560-1564

The Effects of Immobility/Supine Position on Respiratory Function
- Decreased Respiratory Motion
  - Abdomen influence on diaphragm motion
  - Atelectasis
- Increased Risk of Pulmonary Embolism
- Increased Dependent Edema
  - Fluid accumulation in the dependant regions
  - Compression atelectasis

The Effects of Immobility/Supine Position on Respiratory Function
- Decreased Movement of Secretions
  - Impaired ability to clear tracheobronchial secretions
- Normal mechanism dysfunctional in supine position
  - Mucociliary escalator
  - Gravity drainage
  - Cough reflex
- Increased Risk of Atelectasis & the Development of a Ventilator Associated Pneumonia
Hospital Acquired Pneumonia (HAP) and Ventilator-Associated Pneumonia (VAP)

- VAP crude mortality approximately 10-40%.
- HAP crude mortality 15-18%.
- Median rates range 2.4 to 14.7 per 1000 ventilator days.
- HAP rates 5-15 per 1000 patient days.
- Associated cost $30,000-$40,000 per VAP.
- Increase LOS up to 16 days.
- Annual cost $2 billion dollars.

Rello J, Chest. 2002;121(5):1215
ATS Guidelines for Healthcare Acquired Pneumonia 2006

Immobility = Deconditioning

Multiple changes in organ system physiology that are induced by inactivity and reversed by activity.


Skeletal Muscle Deconditioning

- Skeletal muscle strength reduces 1% to 2% daily with strict bed rest.
- Without activity the muscle lose protein.
- 2 types of muscle atrophy:
  - Primary: bed rest, space flight, limb casting
  - Secondary: pathology
- Muscle groups that lose strength most quickly related to immobilization are those that maintain posture, transferring positions & ambulation.
- 1.5kg of skeletal muscle per day, up to 50% within 2 weeks.
- One day of bed rest requires two weeks of reconditioning to restore baseline muscle strength.


Do We Achieve Q2 Hours?

- 74 patients/566 total hours of observation
- 3 tertiary hospitals
- Change in body position recorded every 15 minutes
- Average observation time 7.7 hours
- Online MD survey

- 49.3% of observed time no body position change
- 2.7% had a q 2 hour body position change
- 80-90% believed q 2 hour position change should occur but only 57% believed it happened in their ICU.

Krishnagopalan S. Crit Care Med 2002;30:2588-2592

CLINICAL RESEARCH

Supine vs. Head Elevation
Supine vs. Lateral
Supine vs. Prone
**Supine vs. Degrees of Head Elevation Research**

- Rabow, et. al. 1972
- Vaughan, et. al. 1976
- Dalrymple, et. al. 1979
- Russell 1981
- Ciresi, et. al. 1981
- Gui, et. al. 1982
- Marti & Ulmer 1982
- Minh, et. al. 1986
- Burns, et. al. 1994

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**Position to Facilitate Weaning in Patients with Large Abdomens**

- 19 intubated patients
- Large abdomens r/t obesity, distention & ascites
- CPAP &/or PSV
- Positioned: 0°, 45°, 90°, & RT at 45°

Results: RT at 45° significantly larger tidal volumes & lower respiratory rates than 90°


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**Lateral Positioning Research**

- Patients with predominantly unilateral lung disease improved their PaO₂ when positioned with the GOOD LUNG DOWN
- Patients with more bilateral involvement showed higher PaO₂’s in the right lateral position


**Lateral Positioning Research**

- Good lung down mean PaO₂ : 106.1 ± 12.7 mmHg
- Supine mean PaO₂ : 66.8 ± 3.3 mmHg
- Bad lung down mean PaO₂ : 58.5 ± 2.7 mmHg


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**Take Home Points: Positioning for Unilateral Lung Disease**

- Patients with unilateral lung disease from a consolidated pneumonia type process oxygenate better with the good lung down.
- Patients with other types of unilateral lung dysfunction may not benefit from this positioning technique
- CABG patients should be repositioned at least every 2 hours
- More research is necessary looking at specific unilateral lung disease populations

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**Supine vs. Degrees of Head Elevation Research for Prevention of Ventilator-Associated Pneumonia**
**Risk Factor Categories for Nosocomial Pneumonia**

- Factors that increase risk of aspiration
- Factors that increase bacterial burden or colonization

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**HOB Research**

**Methodology:**
- 86 patients
- Randomly assigned to supine position or HOB 45 degrees (39 semi recumbent, 47 supine)
- Monitored clinical suspected & microbiologically confirmed nosocomial pneumonias

**Results:**
- Microbiologically confirmed nosocomial pneumonia lower in the semi recumbent group 2/39 (5%) vs. 11/47 (23%)
- Supine position & enteral nutrition were independent risk factors for VAP & had the greatest number of VAP’s 14/28 (50%)

Drakulovic MB. et. al. Lancet. 1999;354:1851-1858

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**Lateral Positioning Research**

- Bilateral lung disease
- Unilateral lung disease

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**KEANE™ III Mobility Bed**

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**Meta-Analysis CLRT**

**Methodology:**
- 419 Patients
- 6 Studies:
  - Fink MP. Chest, 1990:97:132
  - Nelson LD, Clin Inten Care, 1992;3:248
  - Summer WR, J Crit Care, 1989;4:45

**Outcomes Measured:**
- Pneumonia, embolus, pressure sores, ARDS, atelectasis, mortality hours intubated ICU days, ICU charges, hospital days

Meta-Analysis CLRT

Results

- CLRT vs. Conventional Turning
  - 50% reduction in incidence of pneumonia (p <0.002)
  - 35% reduction in time intubated (p <0.04)
  - 24% reduction in ICU stay (p<0.02)


CLRT Research

Methodology

- 106 medical ICU patients
- Assigned to 5 DRG groups (sepsis, stroke, COPD, metabolic coma, drug OD)
- Randomly assigned CLRT vs. conventional bed with DRG group
- Rotated > 18 hours per day
- Measured morbidity, time on vent, ICU, LOS, hospital LOS, incidence of pneumonia
- Higher APACHE II scores in bed therapy group

DeBoisblanc BP et al Chest 1993;103:1543

Results

- Significant reduction in nosocomial pneumonia in CLRT group (9% vs. 22%)*
- Greatest in sepsis DRG (3% vs. 22%)**
- With higher APACHE II scores no difference in LOS, morbidity, mortality, or time on ventilator

* p=0.05
**p=0.04

DeBoisblanc BP et al Chest 1993;103:1543

2000’s CLRT Research

Methodology

- 234 Medical-Surgical-Trauma patients
- 137 control, 97 rotation, 22 did not tolerate
- Dialed 40 degrees, > 18hrs, 10min/5min/10min cycle vs. q 2hr
- HOB degree not mentioned
- Measured incidence of VAP, lobar atelectasis & cost

Results

- Incidence of VAP p=.002
- Incidence of lobar atelectasis p=.02
- No difference in ICU LOS, Hospital LOS or mortality
- Rotation average of 5 days


Quality Improvement Project

Union Hospital
Union, NJ
November 1999-March 2000
Presented at 2001 NTI/AACN
Pre-Union Hospital Project

Data...Driving the Change

Situation Analysis
- Placement on CLRT was late
- Inconsistent protocol usage
- No internal monitoring of outcomes
- Lack of staff education on CLRT
- Cost of care for pneumonia was rising
- Concern about spending on CLRT beds
- Data collection on non-rotated patients

The Union Hospital Project

The Process
- Literature review
- Evaluate patient population
- Redesigned existing protocol
- Predicus™ Pneumonia Risk Evaluation tool
- Empowered nursing to order CLRT
- Posted algorithm in all patient rooms
- CLRT tracking tool
- Team to follow & measure outcomes

Union Hospital Ventilator Days

86 Fewer Vent Days

Union Hospital ICU LOS

79 Fewer ICU Days

Union Hospital Hospital LOS

80 Fewer Hospital Days

Union Hospital Total Care Charges

$2.2 MM fewer dollars
Union Hospital
Efica Charges Vs. Total Charges for CLRT Patients

Rotation Therapy Outcome Studies

<table>
<thead>
<tr>
<th>Institution</th>
<th>Year</th>
<th>Key Measures</th>
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</table>
| Stanford Univ MC             | 1994 | Decreased ICU LOS by 5.2 days  
Decreased Days of Pneumonia by 52%                                          |
| Cape Fear Valley MC          | 1994 | Decreased H & ICU LOS, Decreased Vent Days  
Lag time effect: decreased days on therapy                                    |
| Sarasota Memorial            | 2001 | Decreasing LAG time resulted in 14% decrease in HLOS, Vent Days, & 20% decrease of SMR  
[standard mortality ratio]                                                   |
| Medical Center of Georgia    | 2002 | Decrease Vent Days, Decreased Hospital LOS, Decrease ICU LOS by 5-6 days.      |

Lateral Rotation: Summary of Research Findings

- Lateral rotation is effective in reducing the incidence of pneumonia, atelectasis, time on the vent and stay in the ICU
- The earlier the patient is placed on the therapy during their acute illness the better the response
- CLRT appears to have some benefit on oxygenation variables, however more research is required
- The absolute answer on the degree of rotation and the frequency of rotation to achieve the beneficial effect is not available

Systematic method of approaching placement & removal of rotational therapy
Methods

- Retrospective analysis of data collected on 62 CLRT patients
- Mean Apache III score 76.74 ± 33.65/Median 71.5
- 45% overall mortality rate
- Dx: ARDS, pneumonia & respiratory failure
- Medical Critical Care area, Trauma & Thoracic Surgery
- Examined change in PaO2/FiO2 ratios based on:
  - Number of hours spent in rotation over course of therapy
  - Degree of rotation (defined as highest degree patients achieved while on therapy)

Results

- 58% improved oxygenation status
- Average days spent in rotation 4.6 ± 2.3
- Mean hours in rotation 68.45 ± 48.57
- Positive correlation between hours spent in rotation and improvement in PaO2/FiO2 status
- Mean degree of rotation 29.5 ± 6.81
- No correlation noted between degree & improvement in ratio

Prolonged Pause Time in Deep Lateral Position: Negative Impact on Pulmonary Mechanics

- Prospective observational study
- 12 ICU patients with ALI/ARDS undergoing CLRT (62 degree angle)
- Measurement (gases and mechanics) taken during R, L, C rotation and 30 minutes R, L, C

Results

- No changes in gases, shunt or cardiac index
- Lower compliance* & higher PaCO2** in steep lateral 30 minutes pause position than supine

Comparison of Clinical Outcomes in Pulmonary Complications for CLRT via 2 Therapeutic Beds

- Compare outcomes of VAP and Vent LOS with CLRT using 2 different beds
- 12 bed Mixed ICU, 99 intubated patients
- Retrospective analysis of 100% of patients receiving CLRT over a 2 year period (single reviewer)
- Compared outcomes in patients receiving CLRT via TriaDyne and SpO2RT

* p<0.0001
** p<.01

References

Cagle, Pieper & Vollman NTI 1993
Schellingowski P, et al. Intensive Care Medicine, 2006;
Fortune D. 2003, White Paper
Chandler Regional Hospital Catholic Health Care West
Comparison of Clinical Outcomes in Pulmonary Complications for CLRT via 2 Therapeutic Beds

- **TriaDyne**
  - Mean LOS 3.12 days
  - Incidence of VAP while on the Bed: 3
  - VAP % during use of TriaDyne 8.8%

- **SpO2RT**
  - Mean LOS 2.68 days
  - Incidence of VAP while on the bed: 1
  - VAP % during use of the SpO2RT 1.5%

Fortune D. 2003, White Paper
Chandler Regional Hospital Catholic Health Care West

#### Chlorhexidine vs. Povidone Iodine for Catheter Site Care

![Chlorhexidine vs. Povidone Iodine for Catheter Site Care](image)

#### WHEN TO STOP CLRT

- When the patient no longer fits the criteria that placed them on CLRT
- When the patient can be mobilized into an upright position without hemodynamic compromise

#### What is Your Next Move!!!!

Combate deconditioning through progressive positioning when CLRT treatment is completed

#### When to Initiate Progressive Mobilization

- Is the Patient:
  - Deconditioned by > 3 days of immobility, or
  - Ready to begin weaning from the ventilator, or
  - Does the patient require orthostatic training to the upright position
**MOBILITY PROTOCOL**

- Mobility Protocol - Michelle Tracy RN, PhD unit educator at Pitt County Memorial Hospital, Greenville, NC
- Patient’s that meet criteria to be moved are mobilized into Chair Position using the a Bed System 3 times / day.
- Quality tool developed to track outcomes
- Staff have been 90% compliant or greater
- Preliminary results have shown a decrease in LOS and a decrease in VAP

Tracey M. Critical Care Nurse, 2004 “ In Our Unit

**Science of Chair Position**

- Examine the effect of body position on pulmonary mechanics, gas exchange and lung volumes in elderly subjects without lung disease
- 10 subjects, mean age 59, 6F/4M randomly placed in each position for 30min. On 21% 100%
- 3 POSITIONS:
  - Sitting with Feet Down (ST) 75 degrees
  - Semi-fowlers with feet level (SF) 45degrees
  - Supine with feet level (SP) 0 degrees

Pulmonary mechanics and gas exchange are best when ST @ 75 degrees with feet down. May benefit from a bed capable of sitting (ST), with feet down

Slide courtesy of Branson 2006

**Making Early Ambulation a Priority: Impacting Outcomes**

- Pre-post cohort study of respiratory failure patients at LDS
- Respiratory failure requiring > 4 days of mechanical ventilation who were transferred from other LDS units
- Prospective application of an early activity protocol to 104 patients
- Protocol: 3 criteria for activity initiation, neurologic (followed commands & cooperative), respiratory(FIO2 < 60% & PEEP < 10cm & circulatory (no drips or symptomatic orthostasis

Thomsen GE, et al. CCM 2008;36;1119-1124

**Early ICU Mobility Therapy**

- 330 mechanically ventilated patients
- 4 phase step wise mobility progression based on physiologic condition
- Study outcome: # of days to out of bed decreased from 11 to 5 days
- 1/5 of intubated patients got out of bed and liberated from ventilator sooner
- No adverse outcomes
- most frequent reason for ending mobility session was a decrease in SaO2

Peter Morris NTI 2007/SCCM 2008

**Making Early Ambulation a Priority: Impacting Outcomes**

- Results
  - Transferring patient to the unit with an early mobility protocol significantly increased the probability of ambulation ( p < .0001)
  - After 2 days in the RICU, 3 fold increase in the number of patients ambulating compared to pre-transfer rates
  - Female gender, absence of sedatives and a lower APACHE predictive of probability to ambulate (p =.017)

Getting Them Moving
Makes a Difference

Thomsen GE, et al. CCM 2008;36;1119-1124

**2007 - Progressive Patient Positioning**

- Old way
  - Admission, bed, immobilized, supine, complications
- New way
  - Lateral rotation
  - HOB elevation
  - Full-chair position
  - Bed egress/weight bearing
  - Bedside chair
  - Ambulation
  - Enhanced recovery
WHY PRONE POSITION IN ACUTE RESPIRATORY FAILURE?

- To improve oxygenation during prone positioning and after repositioning supine (Langer, Chest 1988; Gattinoni, NEJM 2001)
- To improve the response to recruitment maneuvers during prone positioning (Pelosi, AJRCCM 2003, Oczenski, CCM 2005)
- To improve respiratory mechanics after repositioning supine (Pelosi, AJRCCM 1998)
- To improve drainage of secretions (Pelosi, Eur Respir J 2002; Reignier, Intensive Care Med 2005)

2000’s Prone Positioning Research

Methodology

- Study Period: 1996-1999
- 304 patients with Acute Lung Injury/Acute Respiratory Distress Syndrome randomized to receive 6 hours of prone positioning q 24 for 10 days or supine position with q 2 hour lateral positioning
- Entrance criteria: modified ALI/ARDS definitions
- Measured: Primary endpoints: mortality at 10 days, hospital D/c & 6 months Secondary endpoints: PaO2/FiO2 ratio reduction, organ failure & incidence of complications

Results

- 10 day mortality: 21% vs. 25% (RR 0.84 CI 0.56 to 1.27)
- Hospital d/c mortality: 50.7% vs. 48% (RR 1.05 CI 0.84 to 1.32)
- 6 months mortality: 62.5% vs. 58.6% (RR 1.06 CI 0.88 to 1.28)
- Significant increase in PaO2/FiO2 ratio in the prone group
- No difference in organ dysfunction
- % of patients with new or worsening pressure ulcers per patient was worse in the prone group

Study Concerns

- Was the study methodology relevant?
  - Testing an intervention using 1996-1999 ventilator management
    - TV: 10.3ml/kg ± 2.9 (s)
    - TV: 10.3ml/kg ± 2.7 (p)
    - Average PEEP <10cm
  - Majority of patients entered into the study were primary respiratory pathology vs. secondary
- Were the patients in the prone position a sufficient period of time?
  - Average time prone: 7.0 ± 1.8
**Mortality Benefit in the Most Severely Ill**

Quartiles SAPS II

**2000’s Prone Positioning Research**

Methodology
- Study conducted: Dec 1998-2002
- 791 ARF patients, multicenter trial, unblended, randomized
- 413 prone, 378 supine (8 hours per day)
- Patient in supine group could cross over to prone if P/F ratio < 100 for > 12 hours, or < 60 for 1 hr or on 100% FiO2
- P/F ratio <300, hemodynamically stable & no contraindications to the prone position
- Measured 28 day all cause mortality, duration of mechanical ventilation, incidence of VAP & oxygenation

Guerin C. et al JAMA 2004;292:2379-2387

**Prolonged Prone Ventilation Study**

Methodology
- Multicenter trail: 13 ICU’s accruing 136 ARDS patients randomized within 48hrs of tracheal intubation (Between 1998-2002)
- 60 to supine, 76 to prone (20h/d)
- Guidelines for ventilation & weaning were established

Results
- Mortality: Supine 58% vs. Prone 43% p=0.12
- Simplified APACHE II score higher in prone group
- Independent risk factors for mortality: APACHE score at inclusion, days elapsed prior to inclusion & randomization to supine position
- Minimal complications and rapidly reversible (prone avg. 17hrs for 10 days)


**Meta-analysis: Prone Positioning**

- Review Literature up to November 2007
- 5 trials met the inclusion criteria (1 trail added to assess the effect on VAP
- 1372 patients
- Enrolled trials significantly underpowered & wide variations in level of severity


**Effect on Mortality**

(Effect p=0.79; heterogeneity p = 0.35)


**Effect on PaO2/FiO2 ratio**

(Effect p <0.00001; heterogeneity p<0.06)
Prone-Supine II: The Effects of Prone Positioning for Patients Affected by ARDS
Phase III Trial in Progress


Barriers to Mobility Strategies
- Human or Technological Resources
- Hemodynamic instability
- Knowledge/Priority

Human & Technological Resources
- Personnel
- Aging personnel
- Use of Lift teams
- Fear
- Lines and tubes
- Patient size

Hill-Rom Patient Turning Survey
AACN/NTI Survey 2001
Why it doesn’t always get done

Staff Concerns CC Replies M/S Replies
Limited staff available 85.5% 83.7%
Patient to difficult to move 75.0% 71.6%
Patient too painful to move 62.0% 41.3%
Risk of staff injury 53.1% 58.7%
Staff not capable of moving pt. 27.0% 31.5%
Risk of patient injury 26.3% 27.2%
Too time consuming 21.6% 28.3%

2001 NTI Survey on Patient Positioning = 916 Critical Care Nurses responded
Can We Safely Mobilize Intubated Patients?

Early Activity is Safe & Feasible in ARF Patients

Methodology
- Prospective cohort study
- 103 patients/1449 activity events
- Mechanically ventilated patients for > 4 days
- Airway: Tracheotomy & endotracheal tube
- Measured recorded activity events & adverse events
- Activity events included:
  - Sit on bed, Sit in chair, Ambulate
- Adverse events defined as:
  - Fall to knees, tube removal, SBP > 200 mmHg, SBP < 90 mmHg, O2 desaturation < 80% & extubation

Results:
- Activity events included:
  - Sit on bed (233 or 16%)
  - Sit in chair (454 or 31%)
  - Ambulate (762 or 53%)
- With an ET in place:
  - Sit on bed, chair or ambulate (593)
  - Ambulate (249 or 42%)
- Adverse events
  - < 1% activity related adverse events (no extubations occurred)
  - 69% all to ambulate at > 100 feet at RICU discharge

Barriers to Mobility Strategies
- Human or Technological Resources
- Hemodynamic instability
- Knowledge/Priority

Hemodynamic Instability

Is it a Barrier to Positioning?

The Effects of Immobility on Cardiovascular Function

- Orthostatic Intolerance
  - Deteriorates rapidly with bed rest
  - Occurs within 1-2 days with maximum effect at 3 weeks
  - Results from decreased autonomic tone & fluid shifts

**Hemodynamic Status**

- No differences noted in hemodynamic variables between supine & positions
- Lateral turn results in a 3-9% decrease in SVO2 which takes 5-10 minutes to return to baseline
- Appears the act of turning has the greatest impact on any instability seen
- Minimize factors which contribute to imbalances in oxygen supply & demand


**Patients at Risk for Intolerance to Positioning**

- Elderly
- Diabetes with neuropathy
- Prolonged bedrest
- Low Hb an cardiovascular reserve
- Prolonged gravitational equilibrium


**Additional Factors to Determine Safety**

- Ventilator settings at which mobilization should be withheld?
- Fever is known to increase oxygen consumption should mobilization be held in febrile patients?
- Is there a dose of norepinephrine that predicts harm if mobilization occurs?
- How soon after respiratory failure or shock should mobilization be implemented?
- How do we select the appropriate mode and intensity of mobilization?
- What is appropriate action if a decrease in oxygenation or blood pressure occurs? Stop mobility therapy versus increase in supportive therapies for oxygenation (fractional inspired oxygen concentration [FiO2], positive end-expiratory pressure [PEEP]) and shock (fluid, pressors, blood)?


**Typical ICU Patient**

What is the Rest of the Story

**One-Year Outcomes In Survivors in ARDS/ALI**

- 109 ARDS survivors evaluated at 3, 6 & 12 months post illness
- Survivors young (45 years), Long ICU LOS (median 25 days) and APACHE II > 23
- Loss of 18% Body wt at d/c from ICU
- Muscle wasting & fatigue were reasons for functional limitations
- Lung function & spirometric’s normal 6 months
- CO2 diffusion capacity low for full 12 months
- Absence of steroid use, absence of illness acquired during ICU stay & MODS had better functional status.


**Strategies For Change**
Building a Comprehensive Mobility Protocol

Impacting Patient Outcomes

Implementation/Measuring Success

- Create a Team
- Review the evidence-based guideline
- Ensure you have policies and procedures for progressive mobility (prone, CLRT, Upright/chair/ambulation)
- Identify additional resources for the change
- Determine outcomes measures
  - VAP, time on ventilator, LOS, functional ability, pressure ulcers
- Build value using the science
- Change strategies
- Measuring the outcome and celebrating