

CARING FOR THE LUNGS A TEAM EFFORT

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Mechanical
Ventilation

Immobility

THE ICU PATIENT

Steroids
NMBA

Sedation

Mobility Impairment And The Respiratory System

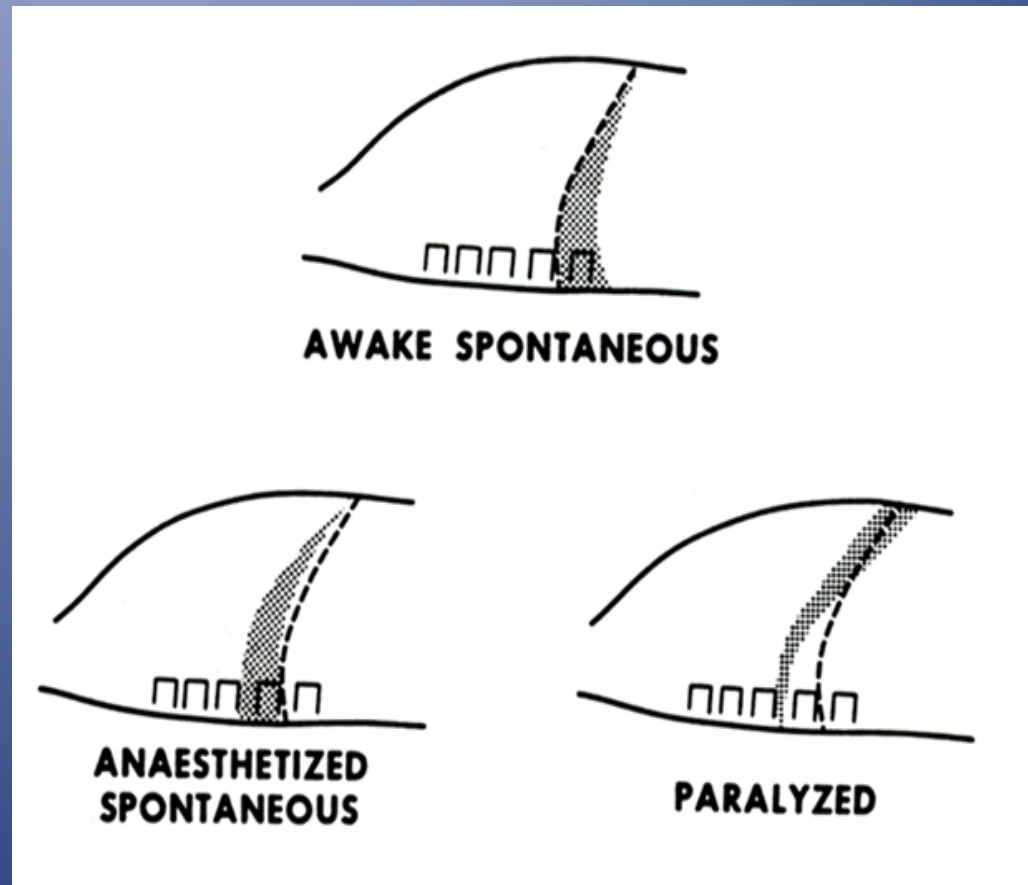
- Decreased clearance of secretions
- Increased risk of pneumonia
- Dependent edema → Dependent atelectasis
- Impaired respiratory motion → Atelectasis
- Increased risk of VTE

1. Vollman KM. *Crit Care Nurse*. 2010;30:S3-S5.

2. Winkelman C. *AACN Adv Crit Care*. 2009;20:254-266.

Decreased Respiratory Motion in the Supine Position

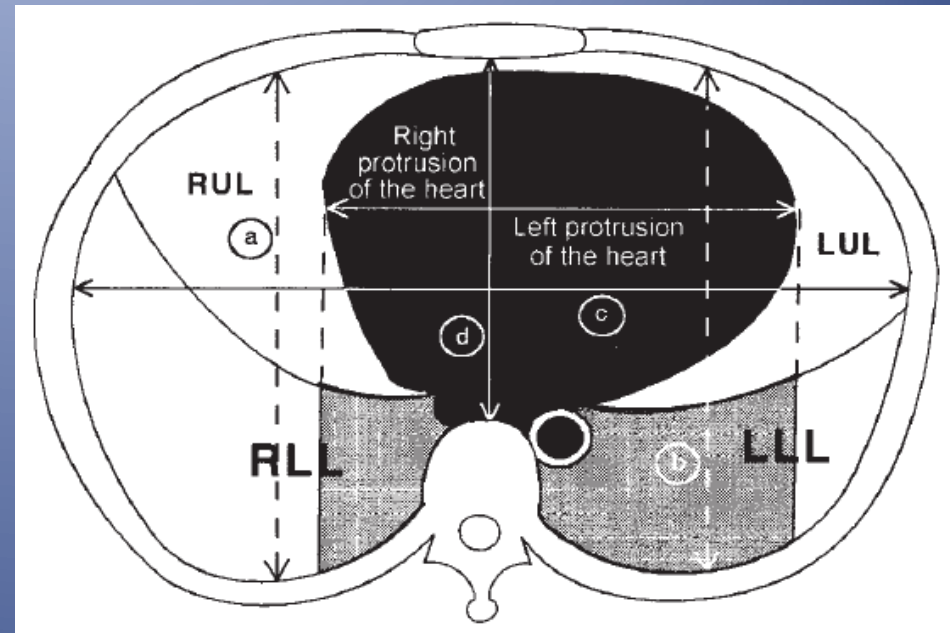
A Reduction in Functional Residual Capacity in the Supine Position¹



1. Froese AB, Bryan AC. *Anesthesiology*. 1974;41:242-255.
Vollman KM. *Crit Care Nurs Clin North Am*. 2004;16:319-336.

Compression Forces of the Heart in the Supine Position

- In the supine position, 17% of the lung tissue volume rests under the compression forces of the heart
 - 11% of the left lower lobe tissue volume
 - 6% of the right lower lobe tissue volume



Consequences of Mechanical Ventilation

- Ventilator associated pneumonia
- Diaphragmatic Dysfunction / Atrophy
- Respiratory muscle weakness
- Impaired mucociliary motility

Ventilator-Associated Pneumonia (VAP) Rates

- Internationally¹

- An average ventilator-associated pneumonia (VAP) rate of 15.8 per 1,000 ventilator-days

- On average, ICU patients with VAP had an additional 11-day increase in length of stay (LOS)

- ICU patients with VAP had an excess mortality of 15%

Excess Mortality
15%

Excess LOS
11 DAYS

- In the United States²

- VAP rates in the United States range from 0.7 to 10.7 per 1,000 ventilator-days in critical care units, including medical/surgical intensive care units (ICU), surgical ICU, and medical ICU

- On average, ICU patients with VAP had an additional 10.5-day increase in LOS³

Respiratory

1. Rosenthal VD, et al. *Am J Infect Control*. 2012;40(5):396-407.

2. Dudeck MA, et al. *National Healthcare Safety Network (NHSN) Report, Data Summary for 2010, Device-Associated Module*. <http://www.cdc.gov/nhsn/PDFs/dataStat/2010NHSNReport.pdf>. Accessed 12/19/2012-17.

3. Restrepo MI, et al. *Infect Control Hosp Epidemiol*. 2010;31(5):509-515.

GET PATIENT OFF
OUT OF BED
DECREASED COMPLICATIONS
VENTILATOR

Multidisciplinary Collaboration

Nurse

Doctor

Pharmacist

Nurse Aid

PT

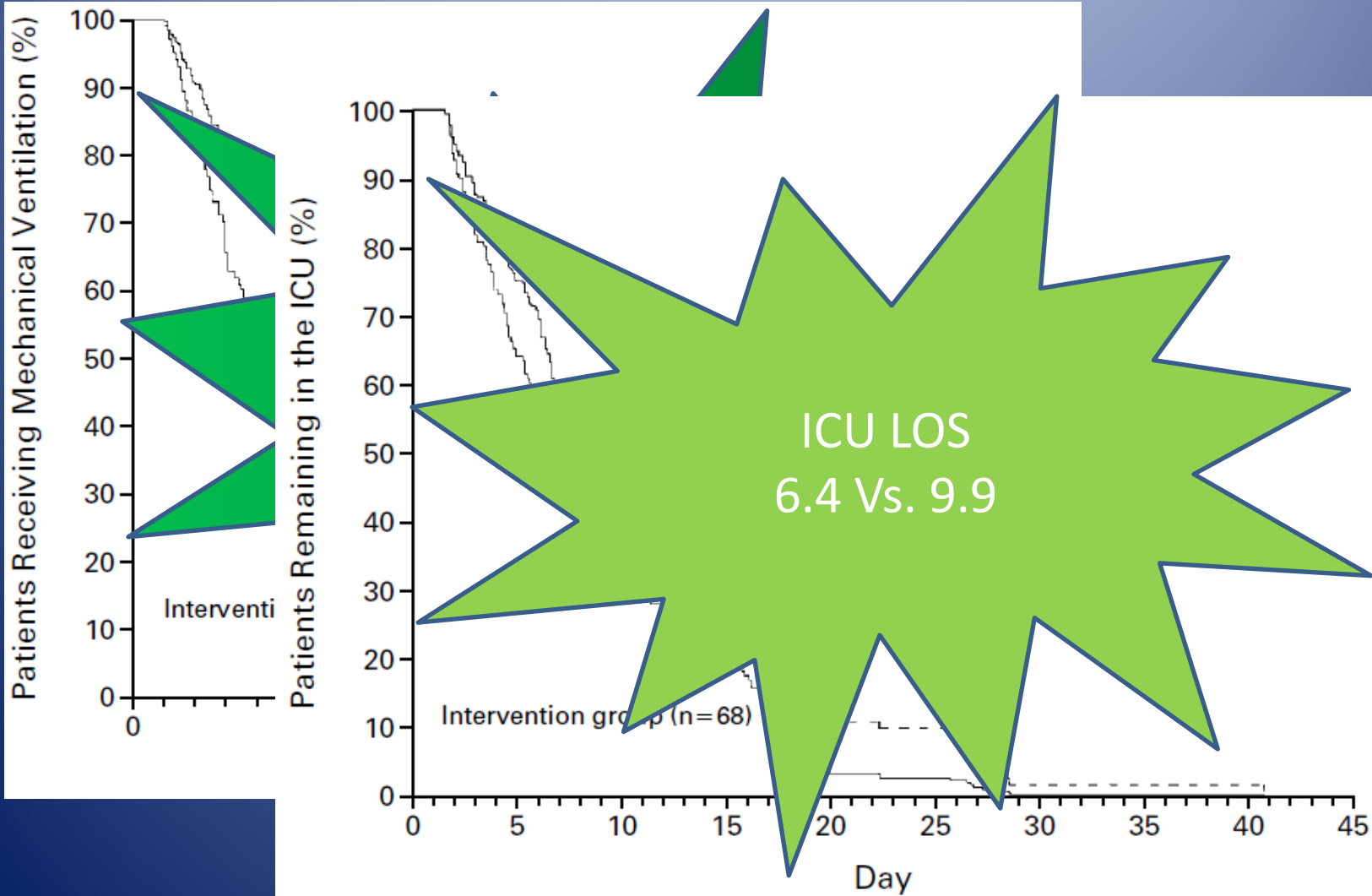
RT

General Interventions

- HOB elevation > 30 degrees
- Subglottic drainage
- ETT cuff pressure > 20 cmH₂O
- Sedation protocols and daily interruption of sedation
- Weaning protocols

DAILY INTERRUPTION OF SEDATIVE INFUSIONS IN CRITICALLY ILL PATIENTS UNDERGOING MECHANICAL VENTILATION

JOHN P. KRESS, M.D., ANNE S. POHLMAN, R.N., MICHAEL F. O'CONNOR, M.D., AND JESSE B. HALL, M.D.





Wake up and Breath

**Ventilator Free
Days**

ICU LOS

Mortality

Chest Physiotherapy

➤ Purpose:

- Promote expansion of the lungs
- Strengthen respiratory muscles
- Mobilize and clear airway secretions



Best Physiotherapy

HFCWC

Huffing
FET

ACFT

ELTGOL

Mech In/Ex
sufflation

Percussion
and Vibration

IFV

Airway Clearance Therapy	Acronym	Definition
Active cycle of breathing technique	ACBT	Directed cough technique; relaxed diaphragmatic breathing and deep breathing cycles followed by forced exhalation technique
Chest physiotherapy	CPT	External chest wall manipulation, which includes one of, a combination of, or all of: percussion, vibration, and postural drainage therapy
Forced exhalation technique	FET	Directed open-glottis cough technique; also called huffing
High-frequency chest wall compression	HFCWC	External manipulation through a vest or wrap worn by the patient, which is connected to a device using bursts of air to compress the chest wall
Intrapulmonary percussive ventilation	IPV	Pneumatically powered, high-frequency short bursts of gas applied at the airway opening (ie, mask encircling the nose and mouth, mouth, or tracheostomy tube)
Mechanical insufflation-exsufflation	(none)	Mechanically applied positive-pressure breath, followed by negative pressure applied to the airway opening
Positive expiratory pressure	PEP	Exhalation against a fixed resistor that creates an increase in airway pressure; includes oscillatory PEP devices such as Flutter and Acapella

Chest physiotherapy for the prevention of ventilator-associated pneumonia

- Small study (60 patients)
- Intervention group (24 patients)
 - Postural drainage
 - Expiratory CW vibrations
 - Airway suctioning

Decreased VAP Rate
OR 0.16

Small Study

with AAD

Increased Rate

VV

AP



PHYSICAL THERAPY And EARLY MOBILITY

Decreases ICU LOS

Decreases hospital LOS

Decreases Days on MV

**Decreases Rate of Respiratory
Infections**

Decreases Mortality???



LEVEL III	LEVEL IV	FLOOR BED
<p>Conscious</p> <p>Passive ROM 3x/d</p>	<p>Conscious</p> <p>Passive ROM</p>	
<p>Sitting edge of bed PT + MT</p>	<p>Sitting edge of bed PT + MT</p>	
<p>Can move leg against gravity</p>	<p>Active Transfer to Chair (OOB) PT + MT Minimum 20 minutes/d</p>	

ICU LOS
5.5 Vs. 6.9

Hospital LOS
11.2 Vs. 14.5

Is there any such thing as **TOO MUCH**
146 ICU Patients
Physiotherapy?

Service A

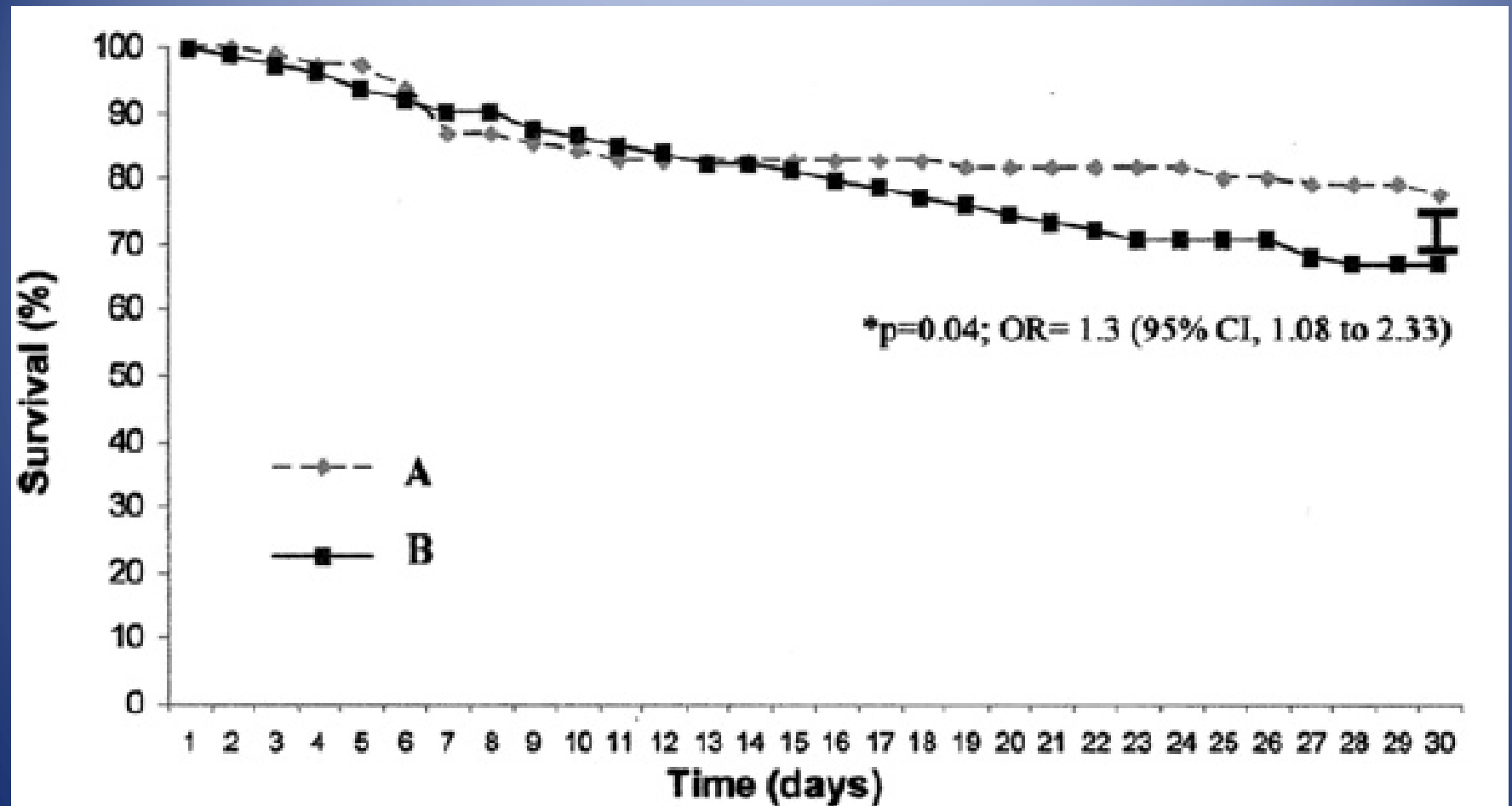
**Physio Available
6 hours/day**

Physio once daily

Service B

**Physio Available
24 hours/day**

**Physio four times
daily**



- Upper and l



Multidisciplinary Collaboration

Nurse

Doctor

**PATIENT
CARE**

Pharmacist

Nurse Aid

PT

RT

THANK YOU