



Early Mobility Program Introduction

Created in Conjunction With
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Learning Objectives

- Understand the importance of early patient mobility
- Recognize traditional standards of care for patient mobility and identify current practice patterns
- Understand the concept of early mobility
- Recognize what evidence supports the use of early mobility
- Determine how to implement an early mobility program

Why Is Early Patient Mobility Important?

Potential Complications of Immobility

Respiratory: respiratory tract infections, atelectasis, and pulmonary embolism¹



Neurological: depression, anxiety, forgetfulness, and confusion¹



Cardiovascular: postural hypotension, cardiac muscle atrophy, orthostatic intolerance, and deep vein thrombosis¹



Musculoskeletal: osteoporosis, muscle atrophy and weakness, and contractures³



Hematologic: anemia¹



Renal: calculi²



Metabolic: glucose intolerance²



Skin: pressure ulcers³



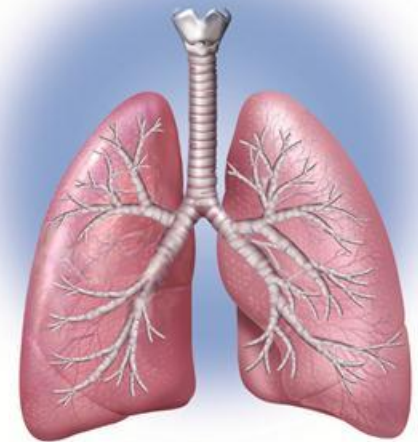
Gastrointestinal: constipation and fecal impaction²



1. Knight J, et al. *Nurs Times*. 2009;105(21):16-20.
2. Knight J, et al. *Nurs Times*. 2009;105(22):24-27.
3. Nigam Y, et al. *Nurs Times*. 2009;105(23):18-22.

Effects of Immobility on Respiratory Function^{1,2}

- Decreased movement of secretions
- Decreased respiratory motion
- Increased risk of pulmonary embolism
- Increased risk of atelectasis
- Increased risk of pneumonia
- Decreased arterial oxygen saturation



Respiratory

1. Knight J, et al. *Nurs Times*. 2009;105(21):16-20.

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

Ventilator-Associated Pneumonia (VAP) Rates

- Internationally¹
 - Average VAP rate of **15.8 per 1000 ventilator-days**
 - ICU patients with VAP had an additional 11.7-day length of stay (LOS)
 - Patients with VAP had an average crude excess mortality rate of 15.2%
- In North America
 - CDC through the National Healthcare Safety Network, VAP rates, per 1000 ventilator-days, **ranging from 0.7 (pediatric cardiothoracic) to 5.8 (burn ICU)**²
 - ICU patients with VAP had an additional 10.5-day LOS³



Respiratory

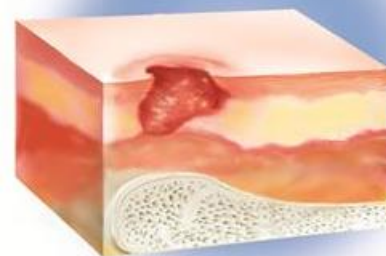
1. Rosenthal VD, et al. *Am J Infect Control*. 2012;40(5):396-407.

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.

Effects of Immobility on Integumentary Function

- Pressure ulcers¹
- The current prevalence of pressure ulcers is high²
 - **1 in 10 patients in acute care**
 - 8.9% of adult ICU patients experience a facility-acquired pressure ulcer³
- The average cost for a patient with a stage III or IV pressure ulcer in the acute care setting is \$43,180⁵



Skin

- **Mobilization of patients is recommended** to help prevent pressure ulcers and might coordinate with 2-hour repositioning schedules⁶

1. Nigam Y, et al. *Nurs Times*. 2009;105:18-22.

2. VanGilder C, et al. Presented at: Symposium on the Advances of Skin and Wound Care. 2010.

3. Lachenbruch C, et al. Presented at WOCN. 2011.

4. Hospital-acquired conditions. Centers for Medicare & Medicaid Services website. http://www.cms.gov/HospitalAcqCond/06_Hospital-Acquired_Conditions.asp. Accessed 1/3/12.

5. CMS. *Fed Regist*. 2008;73:48433-49084.

6. Jankowski IM, Nadzam DM. *Jt Comm J Qual Patient Saf*. 2011;37:253-264.

Effects of Immobility on Skeletal Muscle¹⁻⁵

- Muscle atrophy (almost half of the normal muscle strength is lost after 3-5 weeks of bed rest)
- With exercise, disuse weakness is reversed at a rate of ~6% per week
- Respiratory muscle weakness is a predictor for prolonged mechanical ventilation and delayed weaning
- After less than a day of immobility, contractures start to develop and after 2-3 months of immobility, surgical correction may be needed



Musculoskeletal

1. Morris PE. *Crit Care Clin.* 2007;23:1-20.
2. Nigam Y, et al. *Nurs Times.* 2009;105(23):18-22

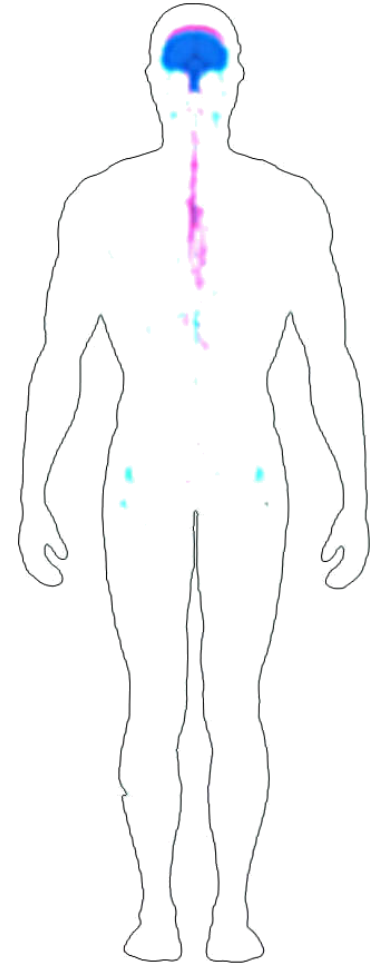
3. Topp R, et al. *AACN Clin Issues.* 2002;13(2):263-276.
4. Nigam Y, et al. *Nurs Times.* 2009;105(23):18-22.
5. De Jonghe B, et al. *Crit Care Med.* 2007;35(9):2007-2015.

The Effects of Immobility on Neurological Function

Neurologic dysfunction

– Delirium

- Acute, fluctuating change in consciousness and cognition
- Develops over a brief time period
- Hyperactive or hypoactive
- Often an ICU complication



Facts About Neurocognitive Impairments

Up to
78%
of ICU survivors
experience
neurocognitive
impairments

46%
neurocognitive
impairment
prevalence
at 1 year

25%
neurocognitive
impairment
prevalence
at 6 years

What Are Some Traditional Standards of Care for Patient Mobility?

What Are Some Traditional Standards of Care for Patient Mobility?

Pressure ulcers and pneumonia

Traditional intervention

- Every 2 hours*
- Manual turning
- Head of bed at 30°

Out of bed to chair

The old standby physician order...

*Although 80%-90% of surveyed ICU physicians believe that every-2-hour turning should occur, only 57% of them believe that it is currently happening in their ICU.¹

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

How Well Are We Really Doing?

- Body position: clinical practice vs standard¹
 - Study of 74 patients in which the change in body position was recorded every 15 minutes for an average observation time of 7.7 hours
 - **49.3% of observed time showed no body position change for >2 hrs, and 2.7% had every-2-hour demonstrable body position change**
- Positioning prevalence²
 - Prospectively recorded, 2 days, 40 ICUs in the United Kingdom
 - Average time between turns, 4.85 hours

1. Krishnagopalan S, et al. *Crit Care Med.* 2002;30:2588-2592.

2. Goldhill DR, et al. *Anaesthesia.* 2008;63:509-515.

What Does Clinical Evidence Tell Us About Early Mobility?

Definition of Early Mobility

- *Early mobility* definition:
 - Planned movement in a sequential manner beginning at a patient's current mobility status and returning them to baseline
- Early mobility includes:
 - Head elevation
 - Manual turning
 - Passive and active range of motion
 - Continuous lateral rotation therapy/prone positioning
 - Movement against gravity
 - Physiologic adaptation to an upright/leg down position (tilt table, bed egress)
 - Chair position
 - Ambulation

Rotational Therapy

- The Medical Center of Central Georgia evaluated the impact of CLRT
- A CLRT protocol was implemented in patients who were identified as at risk for pulmonary complications, and outcomes were compared with a historical comparison group

	Vent Days	ICU Days	Hospital Days	Cost to Treat	ICU Readmission Rates	Reintubation Rates
No CLRT	17.4	18.4	29.7	\$59.4K	21%	19%
CLRT after 48 hours	16.6	18.9	28.8	\$62.1K	17%	13%
CLRT within 48 hours	12.4	13.1	23.4	\$45.2K	4%	4%

- When introduced early, CLRT may reduce length of stay and cost to treat
- CLRT is an option for patient mobility

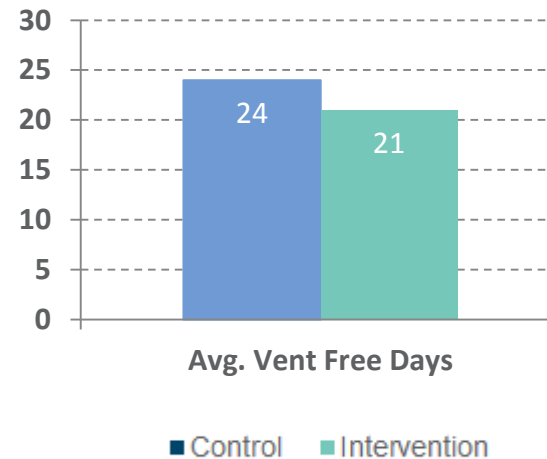
ABCDE Bundle Clinical Evidence

Methodology

- Prospective before-after study
- 186 patients across 5 ICU's
- ABCDE bundle as Intervention

Results

- Fewer ventilator days (24 days without vent assistance vs 21 days in the pre-bundle group).
- Shorter duration of ICU delirium (66% vs 75.3% in the pre-bundle group).



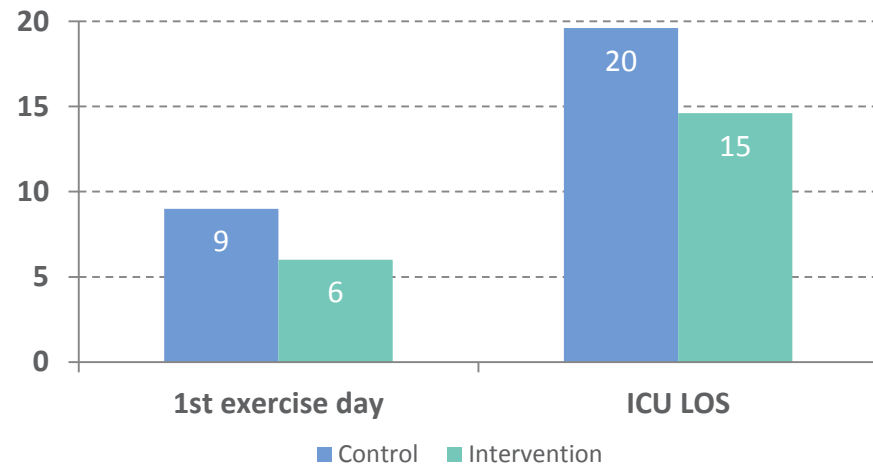
Use of an Early Mobility Protocol to Increase Activity Among ICU Patients¹

Methodology

- Prospective, repeated measures study
- 75 patients across MICU and SICU
- Studied impact of utilizing early mobility protocol on patient outcomes
- Case Western Reserve University Hospital

Results

- First exercise occurred 3 days sooner
- Decreased ICU LOS by 5 days



1. Winkelman C, et al. Examining the positive effects of exercise in intubated adults in ICU: A prospective repeated measures clinical study. *Intensive Crit Care Nurs* (2012), doi:10.1016/j.iccn.2012.02.007.

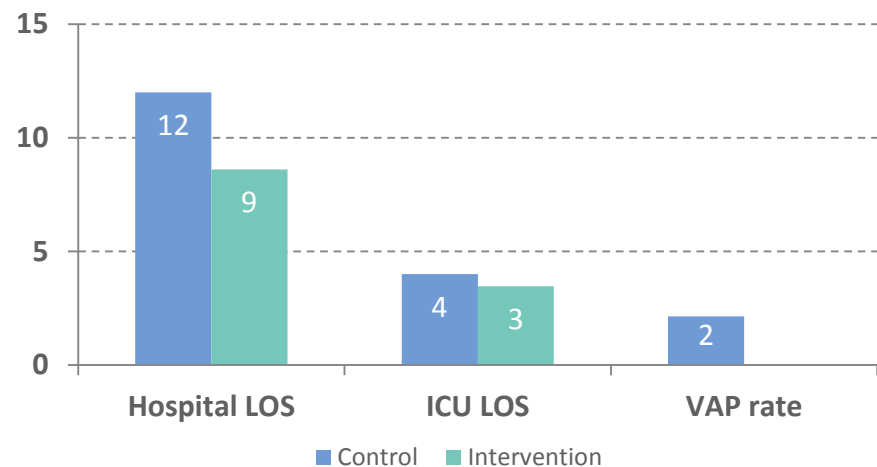
Use of a Mobility Bundle Toolkit in a Neurointensive Care Unit

Methodology

- Prospective intervention trial
- 170 NICU patients
- Used a mobility bundle including the Progressive Upright Mobility Protocol Plus (PUMP) algorithm
- Interdisciplinary education was initiated

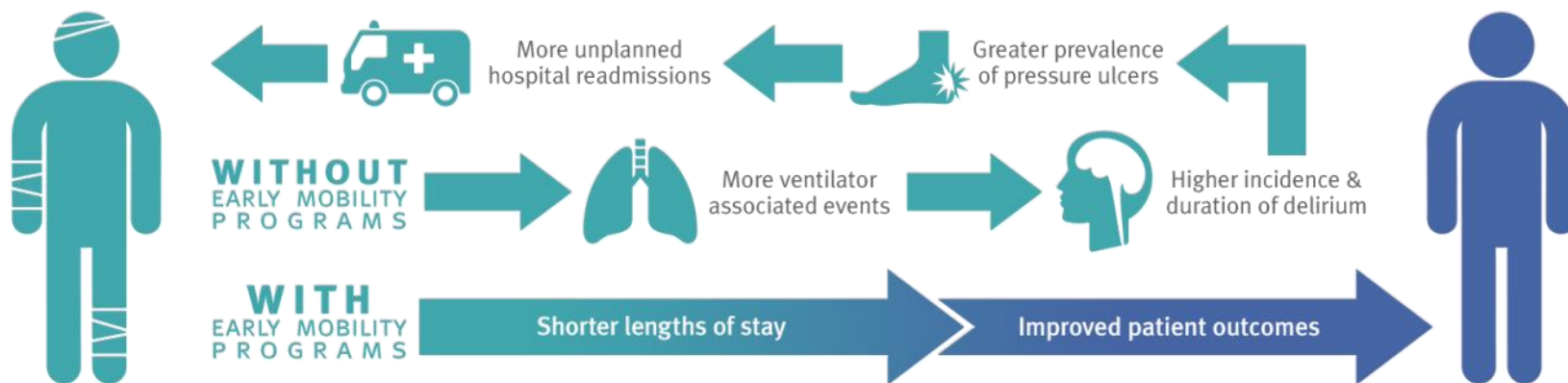
Results

- NICU LOS was reduced by 13%
- Hospital LOS decreased from 12 to 8.6 days
- Hospital-acquired infections were reduced by 60%
- Ventilator-associated pneumonia significantly decreased (from 2.14 to 0).



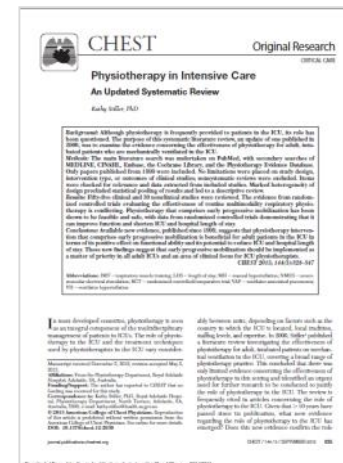
Titworth WL, et al. *J Neurosurg.* 2012;116:1379-1388.

Research on Early Mobility



A recent systematic review shows early mobility is safe and feasible for adult patients in the ICU, and:

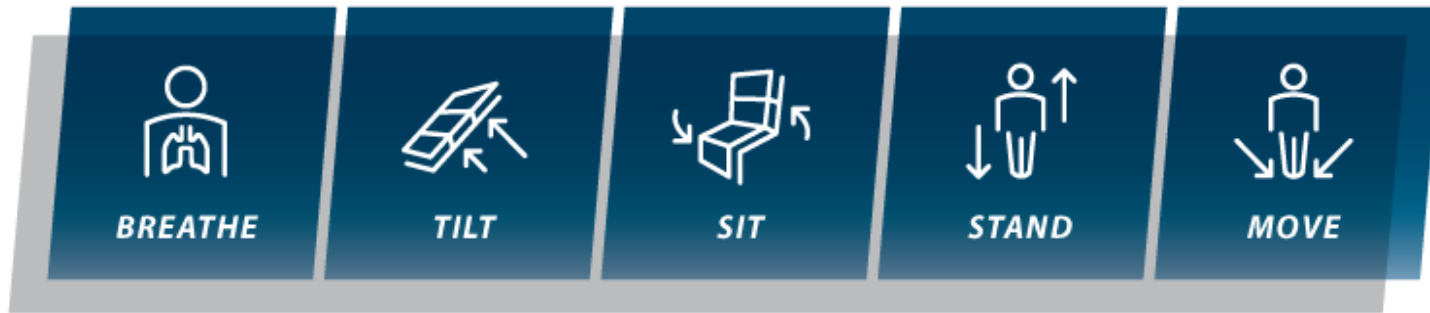
- Fewer cases of ventilator associated pneumonia¹
- Fewer pressure ulcers²
- Fewer cases of delirium and shorter durations of delirium for those with an early mobility intervention¹
- Shorter length of stay in the ICU and the hospital¹
- Fewer unplanned readmissions³
- And even decreased mortality¹



Stiller K. Physiotherapy in the ICU. An updated systematic review. *CHEST*. 2013

1. Stiller K. Physiotherapy in the ICU. An updated systematic review. *CHEST*. 2013
 2. Jankowski IM, Nadzam DM. *Jt Comm J Qual Patient Saf*. 2011;37:253-264.
 3. Morris PE, Et al. *Am J Med Sci*. Early Mobility is Predictor of Improved Outcomes in ARF. 2011

How Can We Implement a Program to Help Patients Achieve Early Mobility and Potentially Reduce Institutional Costs?



Utilizing bed systems combined with lifts and an early mobility protocol, caregivers can progress patients from the flat/supine position through exiting the bed safely, easily, and more often ambulate

This program is a simplified process of small, interventional activities that can be easily accomplished at the bed side with a minimum number of caregivers



Initial Patient Assessment		Level 1: BREATHE	Level 2: TILT	Level 3: SIT	Level 4: STAND	Level 5: MOVE
Assess patients' mobility levels within 8 hours of admission to the ICU and reassess at least every 24 hours.		Patient Assessment: RASS -5 to -3; SAS 1-2 (eg. cannot participate)	Patient Assessment: RASS >-3; SAS >3 (eg. opens eyes; may have profound weakness)	Patient Assessment: RASS >-1; SAS >3 (eg. weak but may move arms/legs independently)	Patient Assessment: RASS >0; SAS >4 (eg. weak but may tolerate increased activity)	Patient Assessment: RASS >0; SAS >4 (eg. weak but may tolerate increased activity)
Start at level 1 if the patient meets any of these criteria or skip to level 2.						
PaO ₂ /FIO ₂	<250					
Positive End-Expiratory Pressure (PEEP)	≥10 cm H ₂ O					
O ₂ Saturation	<90%					
Respiratory Rate (RR)	Not within 10-20 per minute					
Cardiac Arrhythmias or Ischemia	New Onset					
Heart Rate (HR)	<60 or >120 beats per minute					
Mean Arterial Pressure (MAP)	<55 or >140 mm Hg					
Systolic Blood Pressure (SBP)	<90 or >180 mm Hg					
Vasopressor Infusion	New or increasing					
Richmond Agitation Sedation Scale (RASS)	<-3					
Riker Sedation-Agitation Scale (SAS)	<-3					
		Activities <ul style="list-style-type: none"> Maintain HOB ≥30° Consider continuous lateral rotation therapy (CLRT) per protocol q2hr turning Passive range of motion (ROM) 2 times/day 20° Reverse Trendelenburg/Tilt Table with lower extremity exercises/retracting footboard Min 15 mins/Max 60 mins 1 time/day 	Activities <ul style="list-style-type: none"> Maintain HOB ≥30° q2hr turning Passive/active ROM 3 times/day 20° Reverse Trendelenburg/Tilt Table with lower extremity exercises/retracting footboard Min 15 mins/Max 60 mins 3 times/day Legs dependent (partial chair) 15-20 mins 3 times/day Physical therapist (PT) consultation 1 time/day 	Activities <ul style="list-style-type: none"> Maintain HOB ≥30° q2hr turning (assisted) Active ROM 3 times/day Encourage activities of daily living As tolerated FullChair® mode (footboard on) 60 mins 3 times/day Dangling As tolerated PT/ Occupational Therapy (OT) actively involved 1 time/day 	Activities <ul style="list-style-type: none"> Maintain HOB ≥30° q2hr turning (self/assisted) Active ROM 3 times/day Encourage activities of daily living As tolerated FullChair® Egress position (footboard off/ feet on the floor) 3 times/day Stand attempts (consider using a sit-to-stand lift) 3 times/day If tolerates partial weight bearing, pivot to chair 2 times/day PT/OT actively involved 1 time/day 	Activities <ul style="list-style-type: none"> Maintain HOB ≥30° q2hr turning (self/assisted) Active ROM 3 times/day Encourage activities of daily living As tolerated Patient stands/bears weight >1 min 3 times/day Patient marches in place 3 times/day Utilize mobile floor lift to ambulate to bedside chair to achieve "out-of-bed" 3 times/day PT/OT actively involved 1 time/day
		Move to Level 2 When the Patient... <ul style="list-style-type: none"> Has acceptable oxygenation/ hemodynamics Tolerates q2hr turning Tolerates HOB >30° or Reverse Trendelenburg 20° 	Move to Level 3 When the Patient... <ul style="list-style-type: none"> Tolerates active-assistance exercises 2 times/day Tolerates lower extremity exercises against footboard/20° Reverse Trendelenburg Tolerates partial chair position (legs dependent/HOB 45°) Can move arms against gravity 	Move to Level 4 When the Patient... <ul style="list-style-type: none"> Tolerates increasing active exercise in bed Actively assists with q2hr turning or turns independently Tolerates FullChair® position 3 times/day Can move leg against gravity 	Move to Level 5 When the Patient... <ul style="list-style-type: none"> Can successfully comply with all activities Tolerates trial periods of FullChair® Egress position (footboard off/feet on the floor) 3 times/day Tolerates partial weight-bearing stand and pivots to chair 	Continue to ambulate progressively longer distances as tolerated until patient consistently participates and moves independently

Assessed to Level 1 or 2

Progress to Level 2

Progress to Level 3

Progress to Level 4

Progress to Level 5

End Protocol

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Summary: Implementing the Early Mobility Protocol Using the Technology

- Implementation of the early mobility protocol may result in better clinical outcomes and financial outcomes
 - Clinical outcomes may include patients getting off of the ventilator sooner, less VAP, less potential for skin injury, and a reduction in delirium
 - Financial outcomes may include decreased ICU length of stay, decreased ventilator days, and decreased hospital LOS
- Use of early mobility is safe
 - It can be used in patients with ARDS or delirium
 - It can increase the comfort of staff and patients
- Various tools and techniques can facilitate the implementation of a simple, 5-step early mobility protocol

If not this, then what? If not now, then when? If not me, then who?
- John Lewis

Questions?