DEDER GENERAL HOSPITAL

ICU NURSING CARE PACKAGE PROTOCOL

PREPARED BY*: *HSQU

JULY 2016 E.C

DEDER, EASTERN ETHIOPIA

PROTOCOL APPROVAL SHEET

NAME OF PROTOCOL: ICU NURSING CARE PACKAGE PROTOCOL

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THIS PROTOCOL IS EFFECTIVE FROM JULY 2016 E.C TO JUNE 2018 E.C

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1. Background

One of the roles of nurses involves surveillance. This might include watching patients for changes in their condition, recognizing early clinical deterioration and protection from harm or errors. For over 100 years, nurses have performed this surveillance using the same vital signs: **temperature, pulse, blood pressure, respiratory rate and in recent years, oxygen saturation**. Prompt detection and reporting of changes in these vital signs are essential as delays in initiating appropriate treatment can detrimentally affect the patient's outcome.

However, as patients Hospitalized are sicker, these vital signs may not be adequate to identify those who are clinically deteriorating. As such clinical issues to consider when measuring vital signs as well as proposing additional assessments of **pain, level of consciousness and fluid balance or urine output**, as part of routine patient assessment

1.1. MONITORING IN ICU

1.1.1. Principle of care

- Monitoring ensures rapid detection of changes in the clinical status
- Allows for accurate assessment of progress and response to therapy
- When clinical signs and monitored parameters disagree, assume that clinical
- assessment is correct
- Trends are more important than a single reading and make assessment based on
- trends
- Use non-invasive techniques when possible
- Alarms are crucial for patient safety and should be checked frequently
- Results should be observed and interpreted in the context of the patient and

treatment

1.1.2. Vital Sign Monitoring and Interpretation in ICU:

The purpose of obtaining vital signs (VS) is to detect and monitor physiologic states and assess activity responses to aid in exercise prescription. Vital signs determine patient risk for adverse events, such as cardiovascular episodes and syncope.

Compared to outpatient settings, hospitalized patients present more often with abnormal or labile Vital Signs and are at a higher risk of immediate events requiring acute care physical therapists to assess and monitor Vital Signs with greater frequency. Assessing pulse rate (PR), respiratory rate (RR), temperature, and blood pressure (BP) are essential components of a systems review in a physical therapy (PT) examination.
Additionally, tissue oxygenation, measured by pulse oximetry, is necessary to assess hypoxemia.

- Vital Sign at rest help determine readiness for therapy intervention, in conjunction with other findings
- Vital Sign during therapy interventions and recovery assess hemodynamic and oxygenation responses and stability
- Health care providers should monitor Vital Sign for adverse reactions, especially during medication adjustments, transfusions, or other procedures
- Critical Care: (Vital Sign Interpretation in the Intensive Care Unit)
- Intensive care units (ICU) involve more specialized monitoring and invasive treatments that cannot be handled safely in the general wards/floors that should be assessed continually during ICU stay.

Mean arterial pressure (MAP), tissue oxygenation, pH, and serum chemistry are primary VS determinants of patient stability. These are major predictors of ICU mortality along with RR, PR, and body temperature.
It is imperative that specific discussions about Vital Sign with the ICU team and appropriate orders addressing Vital Sign ranges are specified.

1.1.3. Minimal noninvasive Parameters to monitor in ICU

These parameters are: Respiratory rate (RR), SpO_2, Temperature (T), Heart rate (HR), Blood pressure (BP, MAP), Level of consciousness (AVPU), Urine output.

Frequency of Monitoring: During the early resuscitation phase, monitoring multiple parameters (not just one) is necessary to titrate interventions and guide actions. **See Table 1 below.**

Table 1:* *Parameters to be monitored continuously

Parameter	Frequency of monitoring	Limitations
RR, HR and SpO_2	Measure continuously using a non-invasive monitor Normal value is 98–100% (at sea level) goal in adults is more than 90%.	Requires a pulsatile signal – challenging with motion or poor perfusion, Does not measure ventilation (pCO_2), False readings can be seen with abnormal Hb or CO poisoning, Remember to remove nail polish if present!
BP (SBP, DBP, MAP)	Measure every 5–15 minutes during initial resuscitation of patients with shock. Once stabilized, can reduce to every 30–60 minutes. Consider invasive continuous monitor if refractory shock to fluids or need frequent arterial sample	Technically difficult to obtain in shock states Use appropriate cuff size Invasive blood pressure monitoring ,Benefits Directly measures arterial pressure, More accurate ,More reproducible, Continuous
Mental status	Monitor hourly	
(GCS or four scale)	If patient is receiving sedation, analgesia or mechanical ventilation, monitor sedation and pain with standardized scales every hour (RASS, etc.)	
Temperature	Measure at least every 3 hours	
Urine output	Measure hourly	
Physical examination	Focused examination of cardiovascular and respiratory system should be assessed every 30–60 minutes during the resuscitation phases of shock. Once patient is stabilized, can reduce to every 2–4 hours.	
Laboratory tests	As often as needed when managing shock and metabolic abnormalities (i.e. CBC, creatinine, electrolytes, glucose, and lactate). Avoid routine laboratory testing.	

Arterial blood gas analysis	Measure on arrival in patient with Severe hypoxaemia Risk of hypercapnea (e.g. COPD, depressed mental status)	Invasive arterial puncture Heparinized syringe Can consider use of end-tidal CO_2 in conjunction with SpO_2 and RR to make assessment, understanding
Ventilator parameters (if patient on mechanical ventilation)	Every 2-4 hours. This includes: mode, expiratory tidal volume, respiratory rate (patient and machine), PEEP, FiO_2, I: E ratio, flow rate, compliance, plateau airway pressure, peak pressure, set	
Ultrasound	If possible on daily bases and as indicated in ventilated patients.	
Capnography in normal lungs, $PETCO_2$ is about 3–5	During intubation and as needed	Limits: inaccurate if there is no discernable plateau: e.g. airflow obstruction. Underestimates $PaCO_2$ when there is decreased lung perfusion:

2. NUTRITION THERAPY

2.1. Principle of care

- Critically ill patients are in catabolic stress state
- Early nutrition favorably modulates immune response. **Feeding should be started as early as possible or within 48 hours.**
- If hemodynamic instability, start after shock resuscitation
- Nutritional assessment should be done with indirect calorimetry
- Monitoring of nutrition must be done on daily bases and nutritional plan modified accordingly
- Plan for parenteral nutrition if enteral nutrition cannot be achieved in 7 days.

2.2. Feeding procedure

A. Feeding amount

- Use actual body weight unless the patient is obese
- Calories should contain 70% carbohydrate, 30% fat and proteins
- Start with 20kcal/kg, increase to 25 to 30kcal/kg within 5 days
- Protein requirement: 1.2-2.0g/kg actual body weight/day and 2g/kg for sever burn. In acute kidney injury: give 1.0-1.5 g/kg/day if not in dialysis, 1.5-2.0 g/kg/day if on hemodialysis (HD) and 2.0-2.5 g/kg/day if patient on CRRT.
- In trauma patients: give 1.5-2.0 g/kg/day and traumatic brain injury: 1.5-2.5 g/kg/day.

B. How to start enteral feeding

- It can be administered by continuous, intermittent or bolus methods.
- The head of the bed has to be elevated at 30-45 degree to prevent aspiration Absence of bowel sounds is not necessarily contraindication for enteral feeding. Look for abdominal distention, bloating, pain, increased residuals, diarrhea and dilated loops of bowel on films.

If the patient cannot take orally 50% of required amount within 72 hr, or 100 % within 7 days start tube feeding

- ♣ Naso duodenal and naso jejunal tubes (transpyloric tubes):Is used when nasogastric causes frequent aspiration or if gastric emptying time is prolonged
- ♣ Percutaneous gastrostomy, duodenostomy or jejunostomy tubes: these routes may be indicated in patients with esophageal stricture or following esophageal reconstruction

Contraindication to enteral feedings

- ♣ Resuscitated shocks, bowel obstruction, severe and protracted illeus, major UGIB, intractable vomiting or diarrhea, gastrointestinal ischemia

Locally Available Formula foods for enteral use in ICU

Formula diet is recommended whenever possible

- **Mumbay formula** is formulated with the following recipe:
  - **3 boiled eggs + 3 bananas + 3 tablespoons=50g sugar + 9 tablespoons=1.5dl full fat powder milk** OR **1.50dl full fat milk**, **Add filtered water** to make **totally 1liter**.
    - Mix with blender and can be refrigerated **up to 24 hours.**
  - The energy content of **Mumbay formula** per **1000ml <u>is 1000 kcal</u>**.
  - Has caloric density of approximately **<u>1kcal/ml,</u>** protein content of about **40g/1000ml** and have **essential vitamins**, **minerals** and **micronutrients**.

- **Plumpy'Nut:** a ready to use therapeutic food with packaging of **sachet =92 g.**

  Energy/nutrient/**100g is 500 kcal**; **<u>12.5g protein and 32.9g fat</u>**.

C. Parenteral Nutrition

- GI tract is not functional /cannot be accessed /Inadequate GI feeding:
- Consider TPN on day 3-7, if enteral nutrition is not possible or adequate
- Made up aseptically
- Start low and build up
- Usually given with central line in ICU – keep a clean port if PN may be needed.
  - Short term PN – can have PIC (need a different formula) or PICC
  - Long-term TPN – tunneled subclavian catheter (Hickman) or subcutaneous port is usually inserted – OBSERVE STRICT ASEPSIS if handling these lines.

2.3.Manage complications of feeding

a. **High gastric residual diet** (residual volume is more tan 500ml or 50% of the feed)

- Decreasing the feed temporarily
- Making it continuous rather than bolus

- Addition of metoclopramide 10 mg IV or erythromycin and correct electrolyte Consider trans pyloric feeds

b. **Diarrhea during enteral feeding**

Cause could be: hyper osmolar formula, lactose intolerance, malabsorption, infectious causes or drug induced. **Management** of diarrhea during enteral feeding:

- Electrolyte and rehydration therapy:
  - Avoid cessation of feeding
  - Consider reducing rate and strength of feed
  - Consider antibiotic associated colitis
  - If intractable stop feeding till diarrhea stops

c. **Dumping syndrome:**

- Inpatients with concentrated feedings
- Nausea, shaking, diaphoresis ad diarrhea.

d. **Aspiration:**

- Prevention, motility agents, PEG, motility agents

2.4. Monitoring of nutrition:

☞ Four to six hours gastric residual volume monitoring

☞ Look for Abdominal distention

3. MAINTENANCE FLUID

Table 2: ***Fluid requirement calculation***

Maintenance (sensible &insensible losses, fever	4:2:1principle. Eg for a 50kg patient the 1st 10kgx4=40ml/hr; 2nd 10kg x2=20ml/hr; 3rd and above 30x1=30ml/hr. total 90ml/hr x24hrs= 2160ml/24hrs plus insensible loss (300-500ml/24hrs)=2460-2660ml/24hrs plus For each degree of fever above 37 , 2-2.5 ml/kg/day	0-10kg= 100ml/kg/24hrs 11-20kg =1000ml+50ml/kg for every kg above 10kg >20kg- 1500ml + 20ml/kg for every kg above 20kg/24hrs
Fluid deficit	Maintenance/hr x NPO time	
Ongoing loss	For 1ml blood loss 3ml crystalloid, for other losses 1:1	
3rd space loss	Depends on the size of the wound or surgical site and ranges from 4-8ml/kg/24hrs	

- Maintenance volume: consider both sensible and insensible losses, Fluid deficit
    - shock, NPO time, Ongoing loss – bleeding, drainages, any GI loss, 3rd space loss fluid extravasation on the wound side

5. SEDATION, PARALYSIS AND PAIN MANAGEMENT IN ICU

5.1. Pain management

I. Principle of care

☞ Patient COMFORT should be the goal, and includes adequate pain control, anxiolytics and prevention and treatment of delirium.

☞ Light/no sedation is the standard of care for most patients

☞ Deep sedation may cause respiratory, CVS, neurological, psychological and immunological complications and contribute to risk of death.

Table 3: Behavioral Pain Scale (BPS)

Item	Description	Score
Facial expression	Relaxed	1
	Partially tightened (eg. Brow lowering)	2
	Fully tightened (eg. Eyelid closing)	3
	Grimacing	4
Upper limb movement	No movement	1
	Partially bent	2
	Fully bent with finger flexion	3
	Permanently retracted	4
Compliance with MV	Tolerating movement	1
	Coughing but tolerating	2
	Most of the time fighting ventilator	3
	Unable to control ventilation	4

- BPS Score ranges from 3 no pain to 12 maximum pains
- Patient's **self-report of pain** using a10-point pain scale is most reliable (**gold standard)**
- For non-communicative or sedated, use a behavioral pain scale which is score based on facial expression, limb movement, muscle tension and ventilator compliance other method includes.

II. Suggested management of pain

- Give pre-emptive analgesia to alleviate pain prior to invasive or potentially painful procedures.
- Preferably opioid drug: *Fentanyl (0.35-0.5mic/kg, q half to one hr*, and the infusion rate is 0.7-10mic/kg/hr), and *morphine, (IV 2 – 4mg/q4 – 6 hrs or 10 – 20micg/kg* bolus according the response of the patient and the infusion rate is 5 – 40micg/kg/hr).
- *PO administered gabapentine, carbamazepine, or amitriptyline,* in addition to IV opioids, can be considered for treatment of neuropathic pain.
- *Pethidine* has neurotoxic effect especially when renal impairment is identified or expected. When there is no other drug of choice the dose is 0.5 – 1mg/kg/6 hrs. *Ketamine* can be used as analgesic, sedative and bronchodilator in asthmatic patients. Loading dose is 0.5mg /kg bolus, followed by 0.1 – 0.5mg/kg/hr infusion. *Acetaminophen 325-1000mg/4-6hr*s and the daily maximum dose is less than 4gram.
- *Regional analgesics* include epidural analgesia, peripheral nerve blocks, plane blocks (transverse abdominis muscle plane block, serratus anterior block).

6.2. Assessment and management of Delirium

Delirium is fluctuation in consciousness associated with inattention and disorganized thinking or perceptual disturbance that develops over short period of time.

Is an independent predictor of death.

Have three types: *hypoactive, hyperactive and mixed.* Hyperactive is least common but; easiest to diagnose.

It may be due to secondary conditions i.e., pain, primary intracranial process, hypoxemia, shock, infection, electrolyte abnormalities, metabolic disturbances,

medications. Benzodiazepines are a common culprit or drug withdrawal.

Recognize delirium with Confusion Assessment Method (CAM-ICU) score.

Management of delirium

- Treat the underlying medical conditions
- Stop delirium producing/exacerbating drugs (i.e. benzodiazepines).
- Use non-pharmacologic interventions
  - Sleep hygiene: Protect patient sleep cycles by controlling light, reducing noise and stimuli at night, eye shades, ear plugs, cluster patient activities.
  - Orientation: re-orient patient to surroundings, provide reassurance and encourage family visits, have familiar objects in room, Provide visual aids, hearing aids, TV during the daytime, music
  - Early mobilization and exercise
  - Remove tubes and restrains as soon as possible

6.3. Assessment and management of agitation

- Patients may feel an exaggerated sense of fear, nervousness or apprehension.
- Patient may also manifest with hypo-activity and be withdrawn, distrustful or have blunted affect or can present with agitation or increased motor activity. Due to the primary illness (i.e. sepsis) or from the care itself (i.e. medication related).

Recognizing Anxiety: In adults and children, the Richmond Agitation-Sedation Scale (RASS) is easy to use. In children, the Comfort-B scale is commonly used (Table 6-2: Comfort-B scale)

Table 4: Comfort-B scale

Score	Term	Description	
+4	Combative	Overtly combative, violent, immediate danger to staff	
+ 3	Very agitated	Pulls or removes tube(s) or catheter (s); aggressive	
+ 2	Agitated	Frequent non purposeful movement, fights ventilator	
+ 1	Restless	Anxious but movements not aggressive vigorous	
0	Alert and calm		
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening (eye contact) to voice (>10 seconds)	
-2	Light sedation	Briefly awakens with eye contact to voice (< 10 seconds)	**Verbal stimulation**
-3	Moderate sedation	Movement or eye opening to voice (but no eye contact)	
-4	Deep sedation	No response to voice, but movement or eye opening to physical stimulation	**Physical stimulation**
-5	Unarousable	No response to voice or physical stimulation	

6.4. Management of agitation

a. **The pharmacologic options include:**

Propofol (5 – 80 micg/kg/min, on average 50 –100mg/hr in an adult),

Dexmedetomidine (0.2 – 0.7micg/kg/hr), ketamine (0.5 – 1mg/kg/hr), *Fentanyl* (0.5 – 1micg/kg/hr or on average 20 – 50micg/hr), and *Midazolam* (1 – 3mg/hr)

b. ***Sedation Vacations***: daily sedation interruption or a light target level of sedation to minimize sedation drugs side effect, to facilitate patient assessment, to start weaning and to facilitate removal from the mechanical ventilator.

7. Medication administration

Except during emergencies, nurses must obtain written orders for administering new or additional Medication and discontinuing any medication started for specific indication.

The right administration of the prescribed therapies is part of the nurse professional's purpose to whom this protocol is addressed. In particular, the nurse while administering medications is responsible in preventing errors, so he is responsible for checking prescriptions, dispensary/medicine supply, and therapy administration and for monitoring the patient afterward

7. PREVENTION OF ICU COMPLICATIONS

1. Ventilator associated pneumonia

- Oral intubation preferable to nasal
- Use a new ventilator circuit for each patient
- Keep patient in semi-recumbent position: head of bed 30°to 45° Perform regular antiseptic oral care:
  - ☞ **Chlorhexidine mouthwash or gel preferred**
- Once patient is ventilated, change circuit if it is soiled or damaged but not routinely Periodically drain and discard condensate in tubing.
- Use in-line closed suction system
- In adults, change heat and moisture exchanger when malfunctions, soiled, wet or every 5–7 days
- Consider specialized endotracheal with subglottic suctioning devices: Limit aspiration of oropharyngeal secretions
  - ☞ Preform daily, coordinated SBT

2. Gastric ulcer bleeding

Critically ill patients are at increased risk for gastric mucosal injury:

Risk factors:

- Impaired blood flow to the mucosa
- Accumulation of gastric acid
- IMV for more than 48 hours
- Presence of coagulopathy or thrombocytopenia

Prevention:

- Maintain hemodynamics (e.g. early resuscitation).
- Liberate from IMV as soon as possible (e.g. SBT)
- Start early enteral nutrition for mucosal protection.
- Pharmacologic reduction of acid production:
- Histamine-2 receptor blockers (H2R): Cimetidine 400mg LD, 200mg IV BID
- Proton pump inhibitor (PPI): Omeprazole 40 mg once or twise daily

3. Venous Thromboprophylaxis

VTE is one of the most common complications for an intensive care inpatient. Primary thromboprophylaxis reduces the morbidity and mortality associated with deep vein thrombosis (DVT) and pulmonary embolism (PE). For those patients not receiving an adequate VTE prophylaxis, the incidence of DVT is 10–28% , and the incidence of PE is 7–27%. The risk increases depending on the age, the weight, and a previous history of thromboembolic disease. The incidence could increase up to 85% if including the asymptomatic ones.

VTE Prevention

Thromboembolic risk prevention could be made with medications, through a mechanical way, or, more often, with a combination of those. The pharmacological and physical therapies represent a continuum of care led according to patient's characteristics, past and current medical history, surgical and traumatological condition, bleeding risk, and contraindications to both ways of proceeding.

Pharmacological Prophylaxis

Pharmacological VTE prophylaxis could be made with:

- low dose **ultra-fractionated heparin (UFH**),
- low-molecular-weight **heparin (LMWH),**

- **fondaparinux (**selective inhibitor of factor Xa), and
- **oral vitamin K antagonist**, chosen according to patient's risk.

Monitoring has to be carried out with **particular attention** as it needs to detect **signs and symptoms:**

- **of VTE** (***pain, redness, swollen legs, alterations of the breath and saturation***, or ***the skin color***) and
- **of bleeding** (***external, visible internal, or not visible internal bleeding, anemia, and signs of hemorrhagic shock***)

DADAR GENERAL HOSPITAL

Deep Vein Thrombosis (DVT) Prophylaxis Orders (For use in Medical care & Elective General Surgery Patients)

Name _____ *Age* ____ *Sex*___ *MRN*_____ *Ward*_____ *Bed No.* _____

Thrombosis Risk Factor Assessment Tools (Choose all that apply)

Each Risk Factor Represents 1 Point		**Each Risk Factor Represents 2 Points**
☐ Age 41-60 years	☐ Sepsis (<1 month)	☐ Age 61-74 years
☐ Acute myocardial infarction	☐ History of prior major surgery (<1 month)	☐ Central venous access
☐ Swollen legs (current)	☐ Congestive heart failure (<1 month)	☐ Arthroscopic surgery
☐ Varicose veins	☐ Medical patient currently at bed rest	☐ Major surgery (>45 minutes)
☐ Obesity (BMI >25)	☐ History of inflammatory bowel disease	☐ Malignancy (present or previous)
☐ Minor surgery planned	☐ Pregnancy or postpartum (<1 month)	☐ Laparoscopic surgery (>45 minutes)
☐ Abnormal pulmonary function (COPD)		☐ Patient confined to bed (>72 hours)
☐ Serious Lung disease including pneumonia (<1 month)		☐ Immobilizing plaster cast (<1 month)
☐ Oral contraceptives or hormone replacement therapy		
☐ History of unexplained stillborn infant, recurrent spontaneous abortion (> 3X), premature birth with toxemia or growth-restricted infant		
☐ Other risk factors		
Sub Total Risk Factor Score ☐		*Sub Total Risk Factor Score* ☐
Each Risk Factor Represents 3 Points		**Each Risk Factor Represents 5 Points**
☐ Age 75 years or older	☐ Family History of thrombosis*	☐ Stroke (<1 month)
☐ History of DVT/PE	☐ Positive Prothrombin 20210A	☐ Multiple trauma (<1 month)
☐ Elevated serum homocysteine	☐ Positive Lupus anticoagulant	☐ Elective major lower extremity arthroplasty
☐ Positive Factor V Leiden	☐ Elevated anticardiolipin antibodies	☐ Hip, pelvis or leg fracture (<1 month)
☐Heparin-induced thrombocytopenia (HIT)*(Do not use heparin or any low molecular wt heparin)*		☐ Acute spinal cord injury (paralysis) (<1 month)
☐ Other congenital or acquired thrombophilia; If yes: Type _____		
* Most frequently missed risk factor.		
Sub Total Risk Factor Score ☐		*Sub Total Risk Factor Score* ☐
Total Risk Factor Score ☐		

1. ***Patient may not be a candidate for anticoagulant therapy & SCDs should be considered.***
   Active Bleeding, Ingestion of Oral Anticoagulants, Administration of glycoprotein IIb/IIIa inhibitors, History of heparin induced thrombocytopenia/plt <50,000, Hepatic failure INR>1.5, Active Cancer, Renal failure with GFR 30-59/<30 Ml/Min, Central Venous Catheter, *Intra-cranial Hemorrhage of any cause.
2. ***Patient may not be a candidate for SCDs & alternative prophylactic measures should be considered.***
   Patients with Severe Peripheral Arterial Disease, CHF, Acute Superficial DVT.....

- **For Ambulatory Pt Surgery - Orders for venous thromboembolic prophylaxis is NOT required.**
- **If Contraindicated for VTE Prophylaxis; Type Reason:** _____

4. Catheter associated blood stream infection

- ✓ Wash hand wash, use hair cap, face shield
- ✓ Wear sterile gown and sterile gloves
- ✓ Cover entire patient with full sterile sheet
- ✓ Use chlorhexidine to clean skin
- ✓ Sterile technique while using it.
- ✓ Daily reminder to remove if no longer needed
- ✓ Sterile technique when every you use the line
- ✓ Cover the tips with sterile cover
- ✓ Select subclavian site whenever possible

5. ICU acquired weakness

- ❖ ICU-acquired weakness is characterized by neuromuscular weakness and physical limitation
- ❖ Weakness due to:
  - ☞ Direct damage to nerves or muscles
  - ☞ Inflammatory states
  - ☞ Drugs (e.g. NMB or steroids)
  - ☞ Metabolic (e.g. hyperglycemia, malnutrition)
  - ☞ Immobility and atroph
- ❖ **Early mobility and exercise protocol**

  Step 1: Recognize readiness to exercise
  Step 2: Conduct appropriate level of activity based on RASS score
  Step 3: Evaluate performance
  Step 4: Rest for next day
- ❖ It is safe and feasible to do in critically ill patients on mechanical ventilation. Improves patient outcomes:
- ❖ increases muscle strength, functional mobility and independence Reduces delirium
- ❖ Reduces days of IMV Reduces ICU length of stay

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