SARI CLINICAL CARE TRAINING

BEST PRACTICES TO PREVENT COMPLICATIONS

World Health Organization

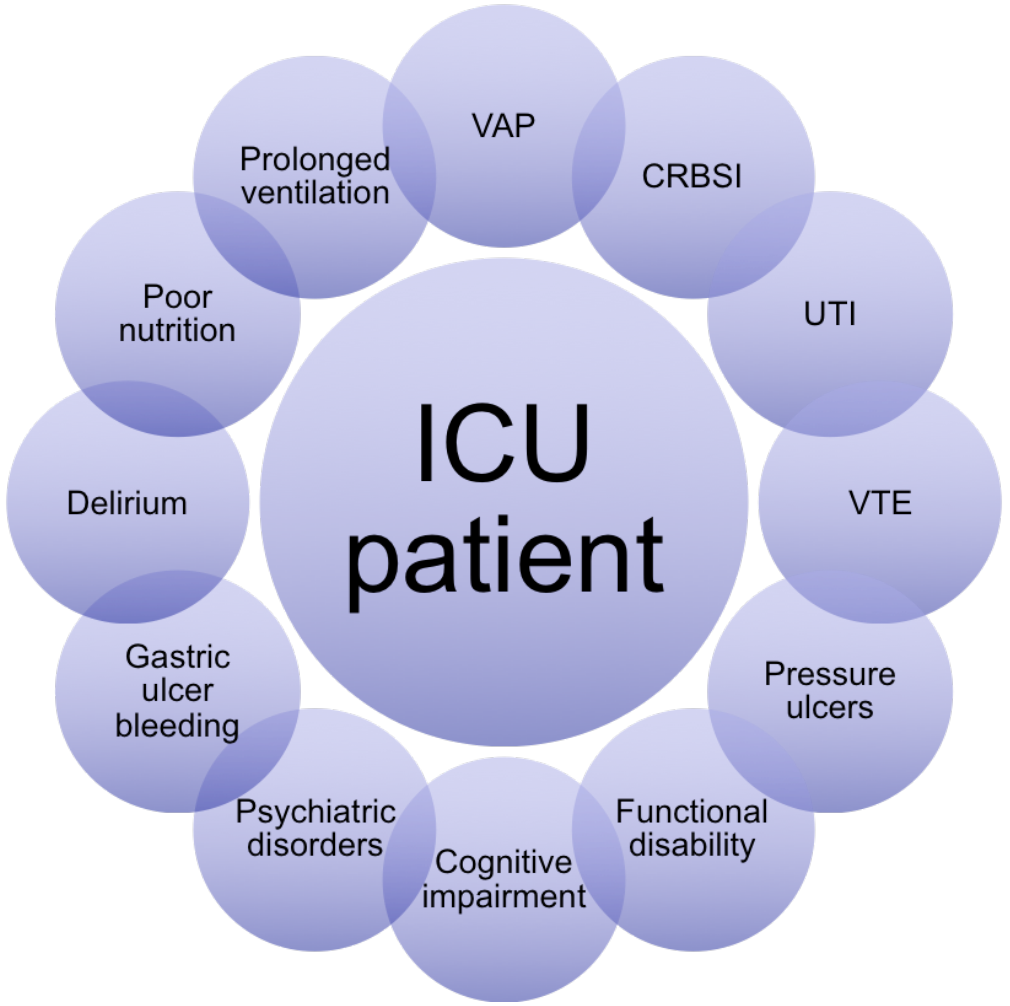
HEALTH EMERGENCIES programme

Learning objectives

At the end of this lecture, you will be able to:

- Describe some of the complications associated with critical illness and best practices for prevention.
- Describe how a using a checklist, or a bundle of care, can improve improve implementation of best practices
- Describe the potential benefits of the ABDCDEF bundle and how to implement!

Patients with critical illness are at risk for short- and long-term complications.



Critically ill patients are susceptible because they suffer from complex diseases, single or multiple organ failure and commonly need invasive monitoring and therapies.

Best practices to prevent complications

Bundle

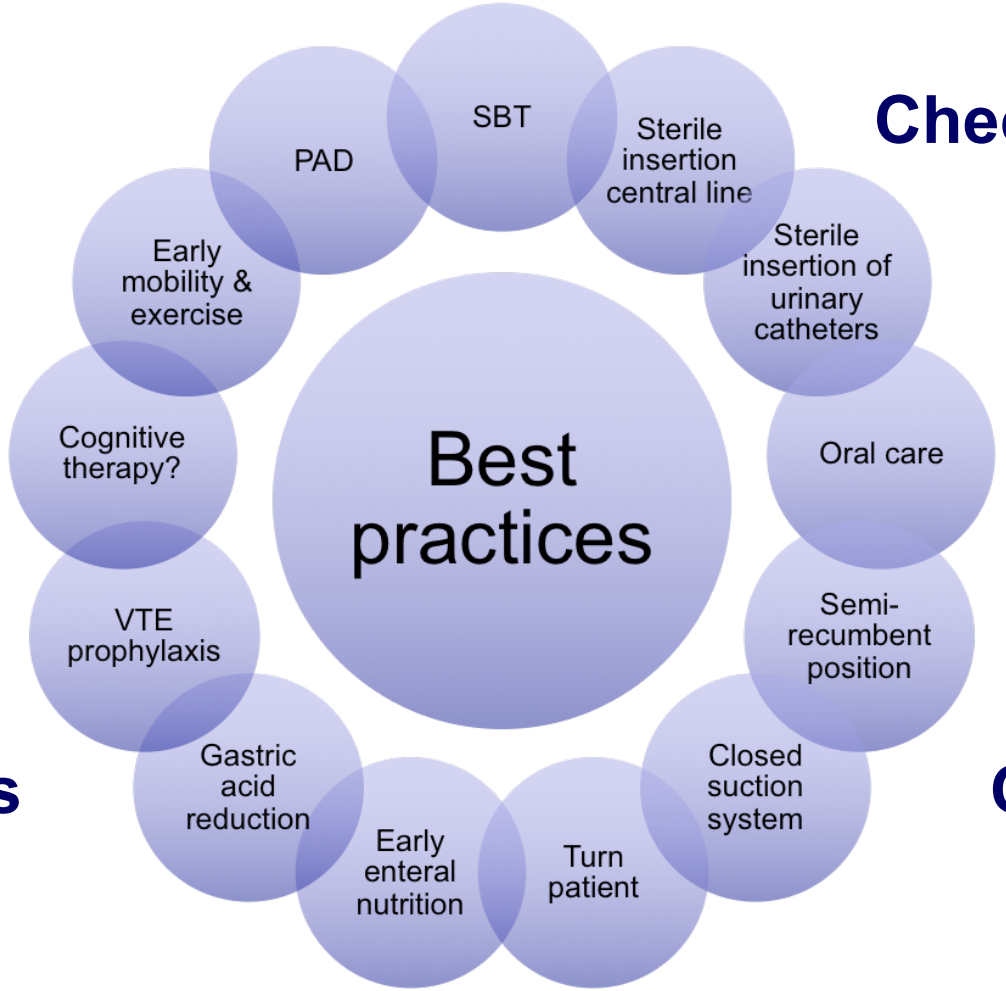
Checklist

Daily goals worksheet

Interdisciplinary rounds

QI projects

Quality rounds



Major challenge is IMPLEMENTATION!
How do all eligible patients get their appropriate preventative intervention?

Tools for implementation (1/2)

- Checklists:
  - tools that can be used in real-time to improve communication, improve teamwork, reduce errors and adverse events:
  - e.g. intubation checklist in your toolkit
  - WHO Surgical Safety Checklist
    - http://www.who.int/patientsafety/safesurgery/checklist/en/

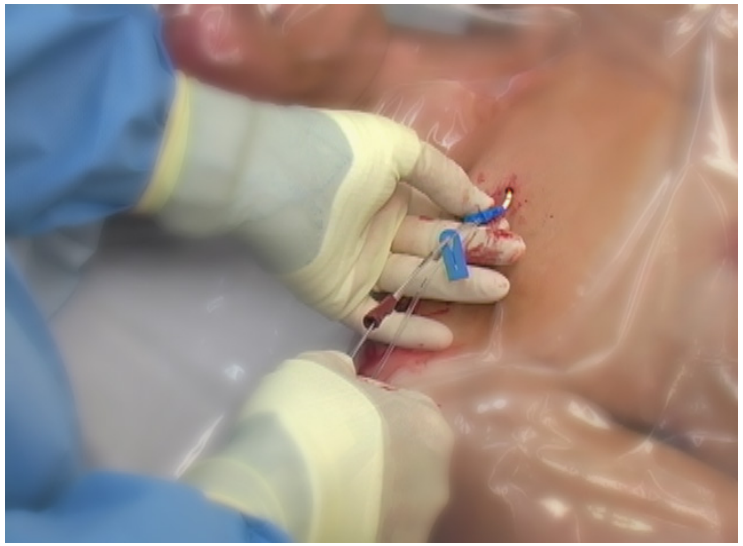
- BUNDLES of care:
  - a set of evidence-based practices that when preformed together in a reliable manner improve patient outcomes (more than if done alone):
  - e.g. sepsis bundle, ABCDEF bundle.

Tools for implementation (2/2)

- Interdisciplinary rounds:
  - formal communication between various care providers (nursing, pharmacist, physical therapist, doctors, respiratory therapist, etc.)
  - prompting best practice adherence (i.e. daily goals worksheet, checklist)
  - patient-centred approach.

- Use a quality improvement approach to determine which tool to use (next lecture).

Checklist prevents BSI

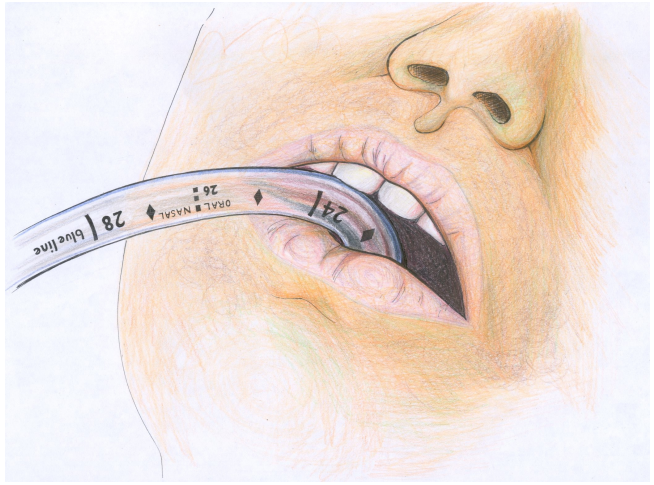


Permission obtained from Dr. Gomersall

- Use a simple checklist during CVC insertion as reminder:
  - ❑subclavian site preferred
  - ❑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
  - ❑daily reminder to remove if no longer needed

Use of a checklist during central line insertion has dramatically reduced incidence of blood stream infections.

Prevent VAP (1/3)



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http://www.aic.cuhk.edu.hk/web8/ETT%20position.htm

- 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°

Though VAP are difficult to diagnose, they are associated with significant mortality, morbidity, length of stay in the ICU and health care costs. These are current standards of care.

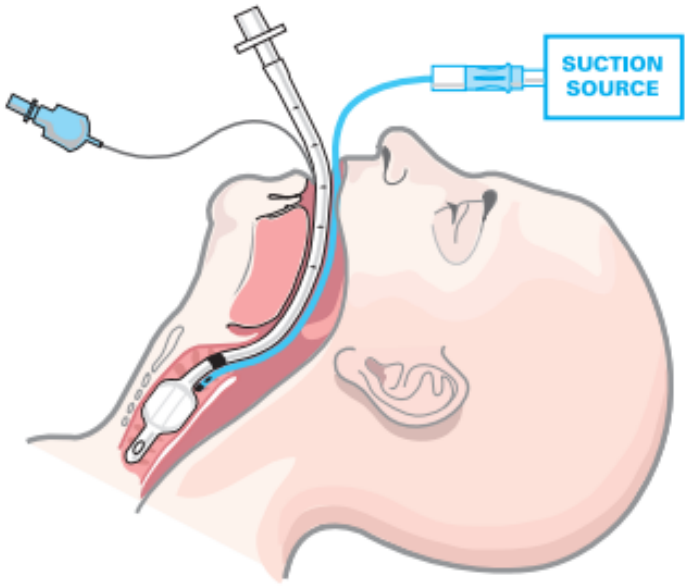
Prevent VAP (2/3)



- 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.

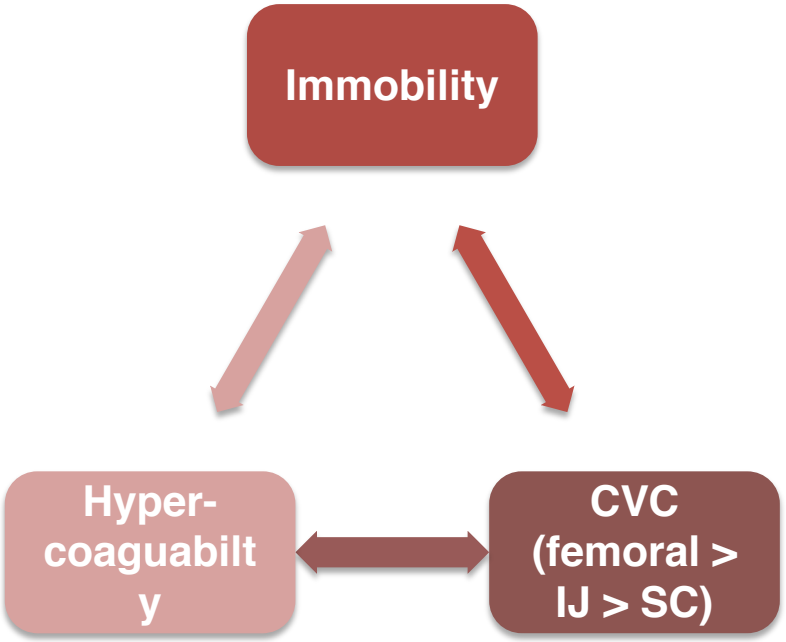
The routine exchange of ETT is not effective to reduce VAP rates or airway oedema.

Prevent VAP: the circuit (3/3)



- 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.

Prevent VTE (1/4)



- If VTE develops, patient may experience:
  - local symptoms
    - oedema, pain, erythema of affected extremity
  - or post-thrombotic syndrome
  - symptomatic or fatal pulmonary embolism
  - Incidence in ICU of VTE around 10%.

Prevent VTE (2/4)

- Critically ill adult and adolescent medical patients are at **moderate** risk for VTE and should receive prophylaxis.

- Younger children may also benefit if at higher risk:
  - thrombophilia
  - morbid obesity

Prevent VTE (3/4)

- Use **pharmacological prophylaxis** for moderate risk patients **not** at risk for major bleeding:

  – low molecular weight heparin (LMWH):
    - enoxaparin 40 mg subcutaneously daily
    - dalteparin 5000 units subcutaneously daily
    - in renal failure, reduce dose of LMWH (except dalteparin)

    * superior to LDUH twice daily dosing in regards to reduction in PE, HIT, cost saving and ease of administration.

  – low dose unfractionated heparin (LDUH):
    - 5000 units subcutaneously every 8 hours or every 12 hours.

Prevent VTE (4/4)



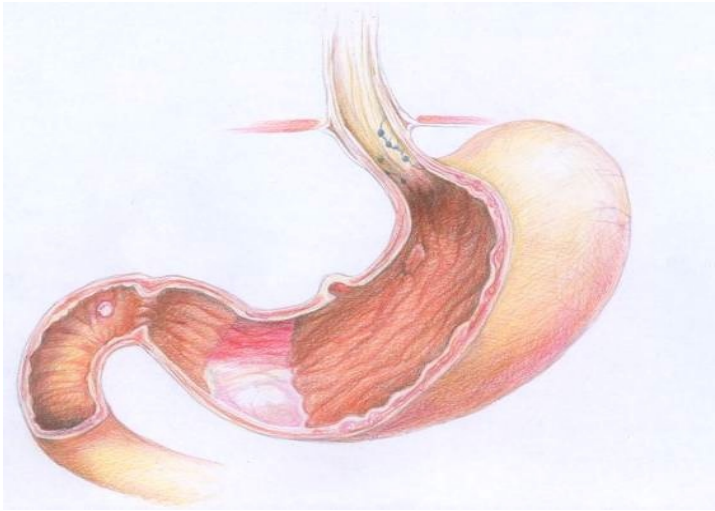
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- Use mechanical prophylaxis if moderate VTE risk patient is also at risk for major bleed:
  - intermittent pneumatic compression devices (may be preferable)
  - graduated compression stockings
  - remember to switch to pharmacologic agent once risk of bleeding has decreased.

Prevent gastric ulcers and related bleeding (1/2)

- Critically ill patients are at increased risk for gastric mucosal injury:
  - impaired blood flow to the mucosa
  - accumulation of gastric acid.

- Two independent risk factors:
  - IMV for more than 48 hours
  - presence of coagulopathy or thrombocytopenia.



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http://www.aic.cuhk.edu.hk/web8/Stress%20ulceration.htm

Prevent gastric ulcers and related bleeding (2/2)

- Reduce risk factors:
  - 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)
  - proton pump inhibitor (PPI):
    - more effective in preventing clinically important GI bleed but may be associated with increase risk of pneumonia and *Clostridium difficile* infection.

Nutrition

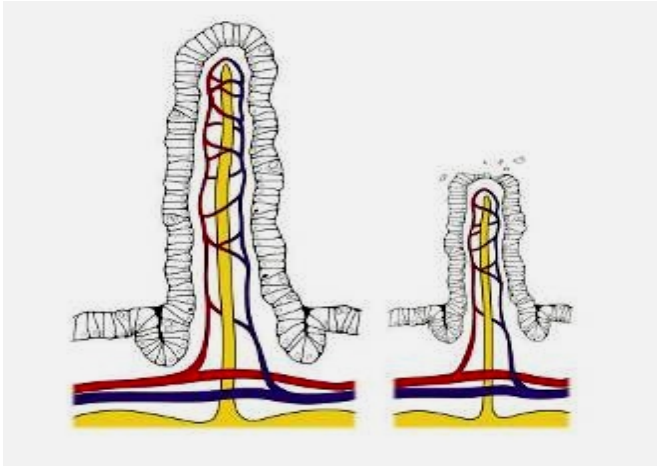


- Carbohydrates
- Lipids (30% daily energy needs)
- Protein
- Vitamins
- Trace elements
- Fluid

Nutritional support (1/2)

- Enteral nutrition (EN) is beneficial:
  - prevents atrophy of gut villi
  - reduces infectious complications
  - reduces gastric ulcer incidence.

- Consider parenteral nutrition (PN) only if enteral feeding is not possible or is insufficient:
  - after 7 days of ICU
  - earlier use of PN is associated in increase risk of infection and cost without clinical benefit.



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Only feed when patient is in semi-recumbent position

Nutritional support (2/2)



- Initiate EN within 24 to 48 hours of admission, after initiation of resuscitation.
- Use standard, locally available formulations.
- Feed breast-fed babies with expressed breast milk.
- Estimate daily caloric and protein requirements.
- Start at low rate, titrate up to target, watch for intolerance:
  - hypocaloric (40–60%) feeds may be as beneficial.

Early mobility and exercise

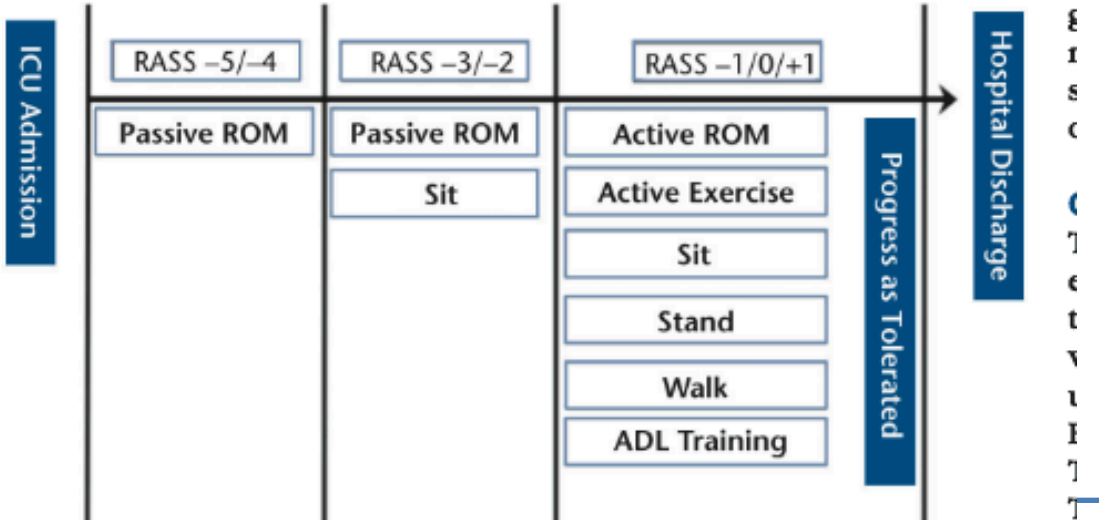
- ICU-acquired weakness is characterized by neuromuscular weakness and physical limitation:
  - 1-year outcome of ARDS survivors found all with persistent loss of muscle mass, proximal muscle weakness and fatigue, and only 50% back at work:
    - uncommon finding in prepubescent children.
  - Weakness due to:
    - direct damage to nerves or muscles
    - inflammatory states
    - drugs (e.g. NMB or steroids)
    - metabolic (e.g. hyperglycemia, malnutrition)
    - **immobility and atrophy.**

Early mobility and exercise protocol



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- **Step 1: Recognize readiness to exercise**
- **Step 2: Conduct appropriate level of activity based on RASS score** (protocol from ACT-ICU trial, 2012, see Toolkit for details)
- **Step 3: Evaluate performance**
- **Step 4: Rest for next day**



Early mobility and exercise protocol

- 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**
  - **saves lives!**

To optimize the impact, implement this intervention as part of the ABCDEF bundle!

ABCDEF bundle:



Create a workflow at your hospital that allows reliable implementation of all practices to ensure optimal outcomes.

Awake and Breathing Coordination → Choose light sedation → Delirium monitoring and management → Early mobility and exercise → Family

Benefits include reduced days IMV, length of stay, delirium, long-term cognitive and disability impairments, and mortality. Studies are ongoing.

Summary: best practices to prevent complications (1/2)

Complication	Prevention interventions
Venous thromboembolism (VTE)	Anticoagulants or pneumatic compression device
Ventilator associated pneumonia (VAP)	Raising the head of the bed, oral care, closed suctioning system
Catheter related blood stream infections (BSI)	Checklist to ensure sterile insertion techniques
Gastric ulcers and bleeding	Histamine receptor blockers, PPI Enteral nutrition
Urinary tract infections (UTI)	Sterile insertion of urinary catheters Appropriate catheter management

Summary: best practices to prevent complications (2/2)

Complication	Prevention interventions
Pressure ulcers	Turn patient every 4 hours
ICU-acquired weakness and delirium	Early mobilization

Summary

- Critically ill patients are at risk for complications in the ICU and the implementation of proven, simple interventions can reduce those risks.

- Consider use of checklists, bundles or interdisciplinary rounds to ensure the right patient is getting the right intervention.

- A bundle is a set of evidence-based interventions that when implemented together improve patient outcomes (i.e. sepsis bundles).

Acknowledgements

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