Centre of Excellence for Clinical Management of COVID 19
All India Institute of Medical Sciences, Bhopal

INFECTION CONTROL
BUNDLES IN ICU
Patient Care-Complex

“Primum non nocere”
First, do no harm!
- Hippocrates

- Invasive procedures - Increasing
- Immunocompromised patients - Increasing
- Hospital environment acts as a source of infection
- Micro-organisms endemic in hospitals are resistant to most antibiotics
## Major HAI's

<table>
<thead>
<tr>
<th>Catheter-associated urinary tract infection (CAUTI)</th>
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<tbody>
<tr>
<td>Ventilator-associated pneumonia (VAP)</td>
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<tr>
<td>Catheter-related bloodstream infection (CRBSI)/ (CLABSI)</td>
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</table>
What is a Bundle?

- **Grouping of best practices** that have been individually proven to improve quality in an area of clinical practice

  - Simple
  
  - Basic

- **Tested and proven interventions** that will improve patient outcomes
Preventing Ventilator associated Pneumonia (VAP)

Strategies to Prevent Ventilator-Associated Pneumonia in Acute Care Hospitals: 2014 Update
Sources of VAP pathogens

- Oropharyngeal colonization
- Gastric colonization
- Contaminated hands and Apparels of health Care workers
- Aerosols
- Contaminated respiratory instruments
- Humidifier fluid
- Suction catheter
- Ventilator circuit
- Bronchoscope
- Wash basin
- Other ICU patient
- Medicine trolley
**Basic Practices**

**Good evidence** that the intervention decreases the average duration of mechanical ventilation, length of stay, mortality, and/or costs: benefits likely outweigh risks

<table>
<thead>
<tr>
<th>INTERVENTION</th>
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<tbody>
<tr>
<td>✓ Use Noninvasive positive pressure ventilation in selected populations</td>
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<tr>
<td>✓ Manage patients without sedation whenever possible</td>
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<tr>
<td>✓ Interrupt sedation daily</td>
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<tr>
<td>✓ Assess readiness to extubate daily</td>
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<tr>
<td>✓ Perform spontaneous breathing trials with sedatives turned off</td>
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<tr>
<td>✓ Facilitate early mobility</td>
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<tr>
<td>✓ Utilize endotracheal tube with subglottic secretion</td>
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<tr>
<td>✓ - Drainage ports for patients expected to require greater than 48 to 72 hours of mechanical ventilation</td>
</tr>
<tr>
<td>✓ Change the ventilator circuit only if visibly soiled or malfunctioning</td>
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<tr>
<td>✓ Elevate the head of the bed to 30 degree to 45 degree</td>
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</table>
**Special Approaches**

- **Good evidence** that the intervention improves outcomes but insufficient data available on possible risks.

### INTERVENTION

- Selective oral or digestive decontamination

- **May lower VAP rates but insufficient data** to determine impact on duration of mechanical ventilation, length of stay, or mortality.

### INTERVENTION

- Regular oral care with Chlorhexidine
- Prophylactic probiotics
- Ultrathin Polyurethane endotracheal tube cuff
- Automated control of endotracheal tube cuff pressure
- Saline instillation before tracheal suctioning
- Mechanical tooth brushing
**Generally not Recommended**

- **Lowers VAP rates** but ample data suggest no impact on duration of mechanical ventilation, length of stay, or mortality

**Intervention**

- Silver-coated endotracheal tubes
- Kintetic beds
- Prone positioning

- **No impact on VAP rates**, average duration of mechanical ventilation, length of stay, or mortality

**No Recommendation**

- **No impact on VAP rates** or other patient outcomes, unclear impact on costs

**Intervention**

- Stress ulcer prophylaxis
- Early tracheostomy
- Monitoring residual gastric volumes
- Early parenteral nutrition

- Closed/in-line endotracheal suctioning
Preventing Catheter-related blood stream infection (CRBSI)
ALL vascular access devices = BSI risk

Central venous catheters (CVC): Internal jugular, subclavian, femoral

Peripherally inserted central catheter (PICC)

Arterial line catheter (ART)

Peripherally inserted catheter (PIV)
Patient Impact

HAIs account for a large proportion of the harm to patients caused by health careنظ.

- Incidence rate estimated for hospitalized adult populations at risk for CLABSI.
- CRBSIs are significant contributors to preventable hospital deaths.2
- Real world evidence has demonstrated an increase in hospital resources - and associated cost - required to treat morbidities due to CRBSIs11-15

1 in 4

Patients who contract CLABSI die7
The majority of CR-BSIs emanate from either the insertion site or the hub\textsuperscript{16-19}

Organisms on the skin gain access to the bloodstream via migration along the external surface of the catheter or catheter hub; both important routes of catheter-related bloodstream infections\textsuperscript{17-21}

Whereas the \textit{intraluminal route} (primarily the hub) predominates after a more extended dwell time\textsuperscript{24-25}

Soon after insertion, the \textit{extraluminal route} or insertion site is the predominate source of infection\textsuperscript{17,22-23}
The use of bundles
Evidence-based recommendations and performance improvement initiatives or strategies are bundled together to improve compliance\textsuperscript{26}

<table>
<thead>
<tr>
<th>Central Line Insertion Bundles\textsuperscript{26-29}</th>
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<tbody>
<tr>
<td>Hand Hygiene</td>
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<tr>
<td>Skin antisepsis using &gt;0.5% chlorhexidine in alcohol solution</td>
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<tr>
<td>Maximal sterile barrier precautions (Mask, cap, sterile gown, large sterile drape and sterile gloves)</td>
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<tr>
<td>Avoid the femoral vein for CVC placement</td>
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</tbody>
</table>
Barrier Precautions

Full body sheet
Maintenance includes many interventions
After catheter insertion, maintenance bundles have been proposed to ensure optimal catheter care\(^2^9\)

**Maintenance Bundles\(^{26-29}\)**

- Assess need for catheter daily
- Perform hand hygiene before manipulation of IV system
- Dressing change recommendations and guidelines based on dressing type
- IV tubing administration set, secondary set and add-on device change guidelines based on medication or product infused
- Disinfect IV access ports with appropriate disinfectant for a period of time
**Recommendation Update [July 2017] Category IA**

Chlorhexidine-impregnated dressings (with an FDA-cleared label) are recommended to protect the insertion site of short-term, non-tunnelled CVC

[Superseded 2011 Recommendation]

**Antimicrobial/Antiseptic Impregnated Catheters and Cuffs**

Use a chlorhexidine/silver sulfadiazine or minocycline/ rifampin -impregnated CVC in patients whose catheter is expected to remain in place >5 days if, after successful implementation of a comprehensive strategy to reduce rates of CLABSI, the CLABSI rate is not decreasing

**Category IA**

**Antiseptic ointment**

Use povidone iodine antiseptic ointment or bacitracin/ gramicidin/polymyxin B ointment at the haemodialysis catheter exit site after catheter insertion and at the end of each dialysis session only if this ointment does not interact with the material of the haemodialysis catheter per manufacturer’s recommendation

**Category IB**
Catheter Care

Factors Predisposing to CRBSI

Factors Predisposing to CRBSI
Catheter Care: is it Correct?
Preventing Catheter-Associated Urinary Tract Infections (CAUTI)
Why CA-UTI?

• Most common hospital-acquired infection
• 40% of all HAIs
• 12-25% of all hospitalized patients receive a urinary catheter
• Half of these found to not have valid indication
• Increased length of stay 0.5 – 1 day
Preventing CA-UTI

1. Avoid unnecessary urinary catheters
2. Insert using aseptic technique
3. Maintain catheters based on recommended guidelines (daily care)
4. Review catheter necessity daily and remove promptly
I. Avoidance Strategies

- External condom catheters for appropriate male patients
- Intermittent catheterization multiple times per day
- Assessing urinary retention with bladder ultrasound
2. Insert Urinary Catheters Using Aseptic Technique

• Utilize appropriate hand hygiene practice.

• Insert catheters using aseptic technique and sterile equipment, specifically using:
  • gloves, a drape, and sponges;
  • sterile or antiseptic solution for cleaning the urethral meatus; and
  • single-use packet of sterile lubricant jelly for insertion.

• Use as small a catheter as possible that is consistent with proper drainage, to minimize urethral trauma.
3. Maintain catheters based on recommended guidelines

- Maintain a sterile, continuously closed drainage system.

- Keep catheter properly secured to prevent movement and urethral traction.

- Keep collection bag below the level of the bladder at all times.

- Maintain unobstructed urine flow.

- Empty collection bag regularly.
Errors

Wrongly placed urinary bag

Catheter - fixation
4. Daily review of necessity with prompt removal

“The duration of catheterization is the most important risk factor for development of infection.” SHEA-IDSA Compendium, October 2008

• 74% of hospitals surveyed did not monitor catheter duration.

• 47% of patient days had no justification for continued catheterization.

• 41% of the time, physicians were unaware of patients inappropriate catheterized.
# Surgical site infection prevention

<table>
<thead>
<tr>
<th>Table 1. 7 S Bundle Approach to SSI Prevention²,³</th>
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<tbody>
<tr>
<td>1. <strong>SAFE OPERATING ROOM (OR) PRACTICES</strong> – Evaluate the safety of your OR</td>
</tr>
<tr>
<td>2. <strong>SCREEN</strong> – Screen for risk factors and presence of MRSA &amp; MSSA</td>
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<tr>
<td>3. <strong>SHOWER</strong> – Have your patients bathe the night before or morning of surgery with chlorhexidine (CHG) liquid soap or CHG-impregnated washcloths</td>
</tr>
<tr>
<td>4. <strong>SKIN PREP</strong> – Use alcohol-based antiseptics such as CHG or Iodophor</td>
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<tr>
<td>5. <strong>SOLUTION</strong> – Use CHG irrigant to remove contaminants in the surgical field</td>
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<tr>
<td>6. <strong>SUTURES</strong> – Use antimicrobial-impregnated sutures</td>
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<tr>
<td>7. <strong>SKIN INCISIONAL PROTECTION</strong> – Use incisional adhesive to seal incision or cover it with an antimicrobial dressing</td>
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Thank You