Management of Carbapenem Resistant Gram-Negative Bacilli (CRGNB)

Multiple antibiotic-resistant gram-negative bacilli are becoming increasingly common due both to selective antibiotic pressure as well the transfer of patients from other countries with endemic resistance patterns. Examples of these resistance patterns include *Klebsiella pneumoniae* carbapenemase (KPC), found mostly in *K. pneumoniae* but also in other *Enterobacteriaceae* and the metallo-ß-lactamases found in *P. aeruginosa* and *Acinetobacter spp.*, and rarely in other *Enterobacteriaceae*. The New Delhi metallo beta-lactamase (NDM-1 enzyme) is an example of this latter form of resistance which was identified originally in *E. coli* and *K. pneumoniae*, but has recently been detected in other *Enterobacteriaceae*.

The following protocol has been written specifically for these newer forms of carbapenemase resistance in healthcare settings. *It is not meant to address carbapenem resistance due to loss of membrane permeability commonly seen in P. aeruginosa. Nor is it meant to address carbapenem resistance noted in strains with inherent resistance such as Stenotrophomonas maltophilia or Burkholderia cepacia.*

The most common mechanism of transmission is contact, both direct and indirect. The following protocol has been written with the intent of managing patients with carbapenem resistant gram-negative bacteria (as described above) to prevent transmission in the acute care setting.

**Screening:**

1. **Patients admitted who have recently been an inpatient in any foreign country (including the USA) during the past 3-6 months should be placed on Contact Precautions upon admission pending results from screening swabs.** If respiratory infection is suspected, use Droplet and Contact Precautions. Assignment to a single room is preferable pending results of screening swabs.

2. **Consult with your local laboratory regarding the types of screening swabs to send.** This is in addition to other routine appropriate admission screens (e.g. for Methicillin resistant *S. aureus* or vancomycin resistant enterococci).

   **Screening swabs may include:**
   - Sputum – if able
   - Wounds – if present
   - Perirectal
   - Urine (if catheterized or signs/symptoms of UTI)

3. **Label the requisition:** Collaborate with your local laboratory on the correct way to label requisitions. This may include wording such as: "Carbapenem Resistant Gram-Negative Bacilli Search" and/or specification of the country visited.
Prevention of Transmission to Others:

2. As always, diligent hand hygiene is the most effective way to prevent transmission within and between other patients and/or staff. Alcohol based hand rub is also effective against these organisms.

3. Any non-ventilated patient with Carbapenem resistant gram-negative bacilli should remain on Contact Precautions until discharged or until discussed with Infection Control.

4. Use Droplet and Contact Precautions if a Carbapenem resistant gram-negative bacillus is in the patient's sputum.

5. Use Droplet and Contact Precautions on ventilated patients pending the results of the admission screen.

6. If a ventilated patient is positive for Carbapenem gram-negative bacilli Droplet and Contact Precautions should be used.

7. Limit equipment that goes into the patient room (particularly respiratory equipment) Meticulously clean and disinfect equipment before use on another patient. All devices, e.g., stethoscopes, should be disinfected before use on another patient.

8. High touch surfaces of patient rooms should be cleaned twice daily (see table in appendix 1).

9. Transfers and/or bed moves should be avoided unless clinically necessary.

Education:

1. Request Infection Control to provide education sessions to all who provide direct care. Issues to be reviewed will include:
   - Proper use of PPE
   - Meticulous hand hygiene
   - The potential for environmental contamination.
   - Understanding the difference between colonization and infection.

Surveillance:

1. Nursing should collaborate with Infection Control and the Medical Microbiology Laboratory to direct ward/unit surveillance of other patients for detection of possible transmission based on risk assessment (e.g. patient population, environment, unit, previous transmission history).

Discontinuing Precautions

1. Consult with Infection Control. If a patient is confirmed as being colonized or infected with CRGNB, Contact Precautions should continue for the duration of the hospitalization during which the CRGNB was isolated. Patients readmitted within 12 months of that hospitalization should be considered colonized with CRGNB and placed on Contact Precautions.

As a reminder, these carbapenemase producing gram-negative bacilli such as A. baumannii or imipenem resistant E. coli are generally not a significant problem in the healthy host.
## Appendix 1: Sample Twice Daily Cleaning List

<table>
<thead>
<tr>
<th>Area</th>
<th>Yes</th>
<th>No</th>
<th>Comments/Reason not done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door knobs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedrails</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light switches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom faucets (including handle)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any grab bars mounted on walls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet (including flush handle)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over-bed table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bed-side table/stand (including drawer handles)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Call light controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Equipment (IV pump, monitor leads)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>