EXTENDED SPECTRUM BETA LACTAMASE (ESBLS)

Cause/Epidemiology

ESBLs are enzymes that confer resistance to most beta-lactam antibiotics, including penicillins, cephalosporins (e.g., cefotaxime), and aztreonam by hydrolysis of these antibiotics.

To date, ESBLs are found exclusively in Gram- negative organisms, primarily in the Enterobacteriaceae family (e.g., Klebsiella pneumoniae, Klebsiella oxytoca, Escherichia coli, Salmonella, Proteus, Enterobacter, Citrobacter, Serratia, and Pseudomonas).

ESBLs are generally found post treatment with broad- spectrum cephalosporins or through acquisition of a resistant strain via contact transmission. Medical use of antibiotics can considerably accelerate the diversification and dissemination of ESBLs. Selective antibiotic pressure leads to colonization of a resident's bowel and skin with risk of subsequent infection. Selective pressure is the pressure placed upon microorganisms that results in a change affecting future generations.

ESBL-producing Enterobacteriaceae have been reported worldwide, most often in the hospital setting (acute care), but also in nursing homes and long-term care settings, as well as community-acquired cases.

Clinical Presentation

Most individuals with ESBLs are colonized, and therefore have no symptoms. Most colonized residents are asymptomatic and may be a source of transmission to others.

For the few people who develop infection symptoms, they will vary depending on the site of infection. ESBL producing strains have been isolated from various sites including abscesses, blood, lungs, catheter tips, peritoneal fluid, throat, sputum, and urine. ESBL producing organisms are responsible for a variety of infections like urinary tract infections, septicemia, hospital- acquired pneumonia, intra-abdominal abscess, brain abscess, and device related infections (e.g., catheters).

Organisms producing ESBL infections present in the same manner as non-ESBL producing organisms. ESBL producing infections can be serious and have been associated with poor outcomes. Therefore, knowing a person has ESBL is important to ensure the most appropriate treatments are prescribed.
Known risk factors for colonization and/or infection with organisms harboring ESBLs include:

- Prolonged stay in an institution (hospital, personal care home)
- Prior administration of antibiotics (especially to extended spectrum beta lactam antibiotics)
- Presence of urinary catheters, intravenous, central venous access devices, gastrostomy or jejunostomy tube
- Recent surgery
- Emergency abdominal surgery
- Admission to a high risk unit (e.g., Intensive Care Unit, Hemodialysis Unit)
- Gut colonization
- Severity of illness
- Ventilator assistance

There is no significant difference between mortality in residents colonized or infected with ESBL producers (range 19-30%) and those who did not get colonized or infected.

**Incubation**

The lower digestive tract of colonized residents is the main reservoir of these organisms. Gastrointestinal carriage can persist for months.

**Transmission**

Transmission is by direct contact via the hands of healthcare workers who become transiently colonized while performing care, when removing gloves, or when touching contaminated surfaces.

Transmission is also by indirect contact with contaminated equipment or surfaces.

**Infection Prevention and Control Practices**

Follow Routine Practices for a resident colonized or infected with an ESBL organism.

Refer to the Routine Practices section 4 and/or the Routine Practices policy # 90.00.060 for specific information.
Contact Precautions should only be implemented for those residents who meet the following criteria:

- Draining infected wounds in which the drainage cannot be contained by a dressing
- Extensive desquamating skin disorder with known or suspected infection or significant colonization
- Acute diarrhea of likely infectious cause if uncontrolled (incontinent) and cannot be contained by incontinence briefs and resident is not confined to bed

Key points for infection control include:

- Hand hygiene with soap & water or alcohol-based hand rub before and after contact with every resident
- Good environmental cleaning, including resident equipment. Special attention to environment cleaning is required as ESBL can live in the environment for long periods (days to months) if cleaning is not performed

Refer to the table Management of Communicable Diseases in Personal Care Homes for specific disease/microorganism information. Refer to Contact Precautions in the Additional Precautions section 5.

**Occupational and Environmental Health and Safety (OESH)**

Healthcare workers exposed to, or infected with an ESBL shall be managed on a case-by-case basis in consultation with Infection Prevention and Control.

Pregnant health care workers can work with residents who are colonized/infected with ESBLs provided they adhere to Routine Practices and Additional Precautions for the specific situation. Pregnant health care workers who have concerns regarding caring for these residents who are colonized/infected with ESBLs should be referred to Occupational Health/designate for further management.