

NMDHB

INFECTION CONTROL FACT SHEET

ESBL

Extended-Spectrum Beta-lactamase-producing organisms are becoming increasingly prevalent in New Zealand hospitals. They occur more commonly in very ill patients who have prolonged hospitalisations, especially in intensive care units.

Factors that predispose people to colonisation and infection with these organisms are:

- Previous admission to an overseas hospital
- Use of invasive medical devices such as urinary catheters, endotracheal tubes and central lines for long periods of time
- The use of broad-spectrum antibiotics.

How antibiotic resistance develops

One of the most common ways that bacteria become resistant to antibiotics is by the production of enzymes. The most common enzymes produced are beta-lactamases, which break down beta-lactam antibiotics such as the penicillins and cephalosporins.

Genes responsible for producing beta-lactamases are found on plasmids. A plasmid is a piece of extra chromosomal DNA in the bacterial cell which is capable of autonomous (i.e., independent) replication. It can transfer antibiotic resistance between members of a single strain or different strains of bacteria.

Some of the first beta-lactamases discovered were those in *Staphylococcus aureus* and *E.coli*. These beta-lactamases break down penicillin and amoxicillin rendering these antibiotics ineffective.

Drug companies produced the cephalosporin drugs (eg cefaclor and cefazolin) to combat these beta-lactamases. From these, extended-spectrum cephalosporin antibiotics (ie cefotaxime, ceftriaxone) and others were developed.

These antibiotics were designed to have an extended spectrum of activity against gram-negative organisms and the beta-lactamases they produced. However, the bacteria have now started to produce extended-spectrum beta-lactamases (ESBLs) that are capable of breaking down all penicillins and cephalosporins, rendering many of these common and important antibiotics ineffective.

Organisms such as *Klebsiella* spp., and *Escherichia coli* are common community- and hospital-acquired pathogens and are usually found in the bowel. Strains that acquire ESBL-production genes are no more virulent or likely to

cause an infection but are more difficult to treat if they do cause an infection.

Diagnosis

Diagnosis of the presence of an ESBL-producing gram-negative organism relies on:

- Detection of ESBLs by the laboratory
- Noting the increasing rates of treatment failure with extended-spectrum cephalosporins

Prevention of transmission

These organisms are spread by contact through hands of health care workers, contaminated items or equipment and via the faecal-oral route.

It is vital that health care workers prevent transmission of ESBLs between patients.

This can be done in hospital by application of Contact Isolation Precautions, attention to good hand hygiene (e.g. applying alcohol-based hand gel), and the decontamination of shared equipment between patients.

Decolonisation

It is not possible to decolonise someone with an ESBL-producing organism - once acquired, a person may carry it for months or years.

Please notify the NMDHB Infection Control Service by phone (03) 546 1800 or fax (03) 539 3519 of any patients who you identify to be colonised or infected with an ESBL organism.

Patients identified as carrying ESBL-producing organisms will have an alert placed on the electronic patient management system to enable them to be identified and managed using contact isolation precautions each time they come to NMDHB hospitals in the future.



NMDHB Infection Control Service
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