Antibiotic-Resistant Bacteria: A Serious Threat?

Jürg Schmid, PhD, Senior Risk Engineer, Zurich Insurance Company Ltd

11th Annual Liability Regimes Conference

Keeping the Floodgates Shut? Mastering Accumulation and Bodily Injury Exposures in a Rapidly Changing Environment

4–5 November 2015, Rüschlikon
Antibiotic-Resistant Bacteria: A Serious Threat?

November 5, 2015
By Jürg Schmid, PhD, Senior Risk Engineer, Zurich Insurance Company Ltd

Annual Liability Regimes Conference
Antibiotic-resistant bacteria

Types of resistances

- **Intrinsic resistance**
  - Not all bacteria species are susceptible to all types of antibiotics. In these cases where bacteria are naturally resistant against a given antibiotic one speaks of intrinsic resistance.

- **Acquired resistance**
  - If bacteria that normally are susceptible to a given antibiotic become resistant one speaks of acquired resistance.
Antibiotic-resistant bacteria

Resistance strategies

- All resistance strategies are genetically encoded. A new resistance can be acquired by a mutation or through the acquisition of genetic material from other resistant bacteria. In principal, every resistance can be transferred from one bacteria species to any other one.

- Some of the resistance mechanisms are quite specific and render only resistance against a single antibiotic whereas others provide broad resistance against classes of antibiotics. Ultimately, a bacteria can acquire resistance against several classes of antibiotics.
Antibiotic-resistant bacteria

Where can such bacteria be found?
Potential hot spots:
- Humans
  - Hospitals and other health care facilities
- Farm animals
  - Poultry
  - Hogs
- Food
Routes of bacterial infection
Typical diseases

- Respiratory tract
- Gastrointestinal tract
- Genitourinary tract
- Unnatural routes opened up by breaks in mucous membranes or skin

- Pneumonia
- Diarrhea
- Urinary track infections
- Wound infections
- Blood stream infections
- Meningitis
- Otitis (inflammation of the ear)

How severe is the problem?

An estimation by the US Center for Disease Control and Prevention

[Image of summary data]

**Estimated minimum number of illnesses and deaths caused by antibiotic resistance***:
- At least 2,049,442 illnesses, 23,000 deaths

* bacteria and fungi included in this report

**Estimated minimum number of illnesses and death due to *Clostridium difficile* (C. difficile), a unique bacterial infection that, although not significantly resistant to the drugs used to treat it, is directly related to antibiotic use and resistance**:
- At least 250,000 illnesses, 14,000 deaths

**WHERE DO INFECTIONS HAPPEN?**

Antibiotic-resistant infections can happen anywhere. Data show that most happen in the general community; however, most deaths related to antibiotic resistance happen in healthcare settings, such as hospitals and nursing homes.

(https://www.cdc.gov/drugresistance/threat-report-2013/)

© Zurich Insurance Company Ltd
Scenarios

1. Situation improves
   - Eradicating antibiotic-resistant bacteria will never be possible
   - But one could minimize the problem by implementing certain measures
     - Very restrictive use of antibiotics
     - Thorough hygiene regimes

2. Situation stays as it is
   - That the situation stays as it is today without any intervention is almost impossible

3. Situation gets worse
   - Most predictions assume that the situation is getting worse than it is today
   - One day we may run out of effective antibiotics