

# MULTIDRUG-RESISTANT GRAM-NEGATIVE BACTERIA

## GROWING CHALLENGES THAT REQUIRE FLEXIBLE NEW STRATEGIES



Multidrug-resistant organisms (**MDRO**) are pathogens that are resistant to several antibiotics. Methicillin-resistant *Staphylococcus aureus* (**MRSA**) are among the most common causes of MDRO infections worldwide. In addition, there is an increasing prevalence of vancomycin-resistant enterococci (**VRE**) and multidrug-resistant Gram-negative bacteria (**MDRGN**).

When it comes to patient safety, particular importance should be attached to the prevention of HAIs – healthcare-associated infections – and the containment of MDROs.



### Increasing antibiotic resistance & therapeutic bottlenecks

- **MDRGN** bacteria such as carbapenem-resistant Enterobacteriaceae (CRE) and *Pseudomonas aeruginosa* strains (CRPA), are **resistant** to many classes of antibiotics
- **The lack of effective treatment options** complicates the treatment of severe infections (sepsis, pneumonia, urinary tract infections, etc.)
- **Reserve antibiotics** such as cefiderocol are available, but
  - often come with **high costs**
  - are often **limited in their effectiveness** and associated with **side effects**
  - require **strict indications** to avoid further resistance development
- **Expensive, lengthy research and development** of new antibiotics and alternative active substances, and the associated unprofitability for the pharmaceutical industry



### Prevention and control measures in medical facilities

- Comprehensive infection control required:
  - **Compliance with complex hygiene plans** and specialized guidelines that provide in-depth information and define measures
    - Including monitoring, decolonization, surface disinfection, hand hygiene, and the use of Point-of-Use water filters
  - Use of **surveillance programs** for early detection of outbreaks
- Challenges in implementation:
  - **Staff shortages, high workloads and time pressure** make it difficult to consistently adhere to hygiene protocols
  - Increasing **cost pressure** poses a **high risk**: Losses in the **quality** of equipment, analytics/diagnostics, etc., as well as supporting **technologies**

Multi-barrier system

## THE MDRGN PROFILE

### What are MDRGN?

- **Gram-negative bacterial species** that are **resistant to several groups of antibiotics**
- **3MDRGN**: Resistance to three of the four antibiotic groups
- **4MDRGN**: Resistance to all four antibiotic groups

### Where do they occur?

- **Frequently found in hospitals** where antibiotics are used extensively
- They can **also colonize healthy people** without causing infection

### When does it become dangerous?

- If MDRGN bacteria enter **wounds** or the **bloodstream** and result in **infections that are difficult to treat**

!! When even **reserve antibiotics** such as carbapenem **are no longer effective**, an infection becomes **life-threatening**.

Mortality reaches almost  
**60 percent**  
from carbapenem-resistant Enterobacteriaceae bacteremia



Disease-related deaths worldwide per year:  
**8.9 million**  
from bacterial infections, due in part to MDROs



Bacterial infections are thus one of the **leading causes of death** worldwide.



### Global spread and transnational risks

- Rapid spread through:
  - **International travel and medical tourism**
  - **Patient transfers** between clinics without uniform resistance screening
  - **Food chains and imports** as potential sources of resistant pathogens
- Need for **international control measures**:
  - Essential harmonization of surveillance programs for MDRGN/MDRO detection (e.g., WHO's One Health Surveillance Model GLASS)



Find out more about:

**ANTIBIOTIC RESISTANCE**