HARTMANN

Estimation of the global burden of bacterial antimicrobial resistance 2019

The global burden of bacterial antimicrobial resistance (AMR) shows regional variations in terms of frequency of infections, causative agents as well as pathogen-drug combinations.

Systematic analysis of the Antimicrobial Resistance Collaborators (an asscociation of several international experts and authors)

STUDY RESULTS

Number of estimated deaths in 2019
- 4.95 million deaths associated with bacterial AMR
- 1.27 million deaths attributable to bacterial AMR

Geographical distribution of estimated death rate
- Highest in western sub-Saharan Africa (27.3 deaths per 100,000)
- Lowest in Australasia (6.5 deaths per 100,000)

Six leading pathogens for deaths associated with resistance
E. coli, S. aureus, K. pneumoniae, S. pneumoniae, A. baumannii, P. aeruginosa
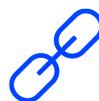
Leading pathogen-drug combination
Methicillin-resistant *S. aureus* (MRSA) responsible for more than 100,000 deaths attributable to AMR

STUDY DESIGN

Estimation of deaths and disability-adjusted life-years (DALYs)

Attributable to bacterial AMR
Associated with bacterial AMR

STUDY PERIOD

2019

SOURCES

Systematic literature reviews

Hospital systems

Surveillance systems

Other sources

DATA BASIS

23 pathogens

88 pathogen-drug combinations

204 countries

471 Million individual records or isolates
7,585 study-location-years

Research for infection protection

Source: Antimicrobial Resistance Collaborators (2022) Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. Lancet 399: 629–655.

BACKGROUND

Bacterial antimicrobial resistance (AMR) is one of the leading public health threats of the present time. To be able to make targeted decisions on infection prevention and control (IPC) measures in the future, comprehensive information on the burden of bacterial AMR, its global distribution and the most common pathogen-drug combinations is essential.

GOAL

The aim of the study was to estimate the burden of bacterial AMR using a broad range of input data and including a comprehensive set of pathogens and pathogen-drug combinations.

DESIGN AND METHODS

The approach was divided into ten steps of estimation:

- Steps 1+2:
  Estimation of deaths with a background of infection
- Steps 3+4:
  Estimation of the pathogen distribution of each infection for deaths as well as incident cases
- Steps 5-7:
  Analysis of the proportion of resistance for each pathogen
- Steps 8+9:
  Comparison of the relative risk of death for drug-resistant infection with drug-sensitive infections
- Step 10:
  Calculation of the burden of deaths attributable to and associated with drug resistant infections

These components were used to estimate the disease burden based on two counterfactuals:

- Deaths attributable to AMR
- Deaths associated with AMR

RESULTS

Despite of mentioned study results regarding number of estimated deaths (see fig. 1), geographical distribution, types of causative pathogens and pathogen-drug combinations, the estimation considered the types of infections responsible for the burden of AMR.

Three infectious syndromes dominated the global burdens attributable to and associated with AMR:

- Lower respiratory and thorax infections
- Bloodstream infections
- Intra-abdominal infections

These three syndromes together accounted for 78.8% of deaths attributable to AMR in 2019.

Figure 1: Estimated number of deaths in 2019

4.95 million

1.27 million

An estimated **4.95 million** (3.62–6.57) **deaths associated** with bacterial AMR,

including **1.27 million** (95% UI 0.911–1.71) **deaths attributable** to bacterial AMR
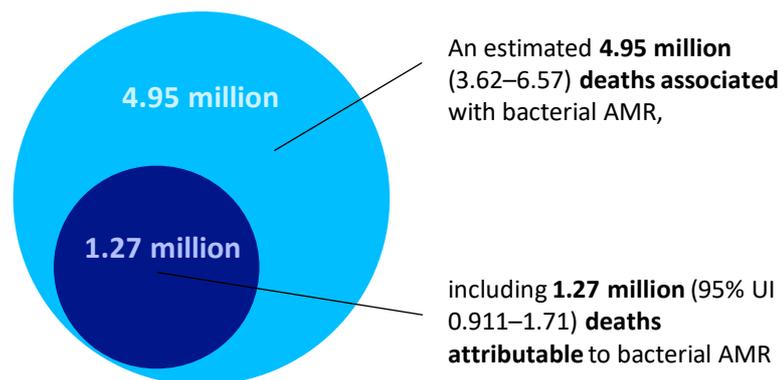
CONCLUSION

The present data show that AMR is a major health burden and underline the urgent need for global intervention strategies with local adaptations. Intervention strategies should include IPC measures, vaccinations, reduced exposure to antibiotics (e.g. through farming), minimal use of antibiotics, new development of antibiotics.

SCIENCE CENTER HARTMANN

Research for infection protection