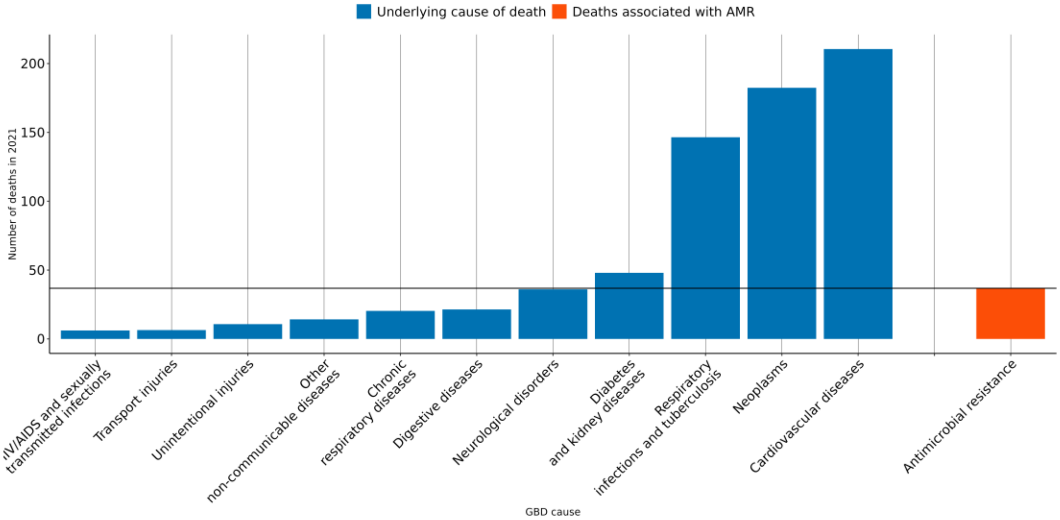
The burden of antimicrobial resistance (AMR) in Bermuda

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **8 lives** have been lost each year since 1990 in Bermuda due to AMR.
- In 2021, there were an estimated **8 UI (5-11)** deaths attributable to AMR and **37 UI (26-47)** deaths associated with AMR in this location.
- The largest number of deaths associated with AMR in 2021 occurred among those aged **70+** in the country.
- Among the most deadly pathogen-drug combinations in 2021 were *Staphylococcus aureus* resistant to methicillin, *Acinetobacter baumannii* resistant to carbapenems and *Streptococcus pneumoniae* resistant to carbapenems.

Figure 1 Number of deaths by underlying cause, and those associated with AMR in 2021



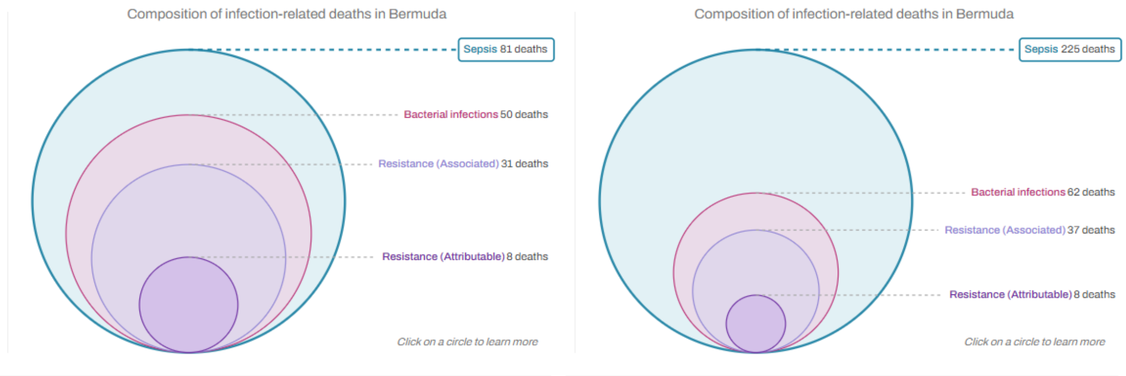
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying cause of death by itself.
- At the 2024 United Nations General Assembly high level meeting on antimicrobial resistance, country members agreed to aim for a **10% reduction** compared to 2019 baseline **(from 4.95 to 4.45 million)** in the global number of deaths associated with AMR by 2030. But our forecast indicates that in absence of concerted action, deaths associated with AMR could reach **5.5 million** (UI 4.8 - 6.2) if current trends continue. For Bermuda, a 10% reduction means to decrease the number of deaths associated with AMR to **32**, but currently the trend for this country could reach up to **41 UI [29-57]** AMR-associated deaths in 2030.

AMR in Bermuda

Key takeaways

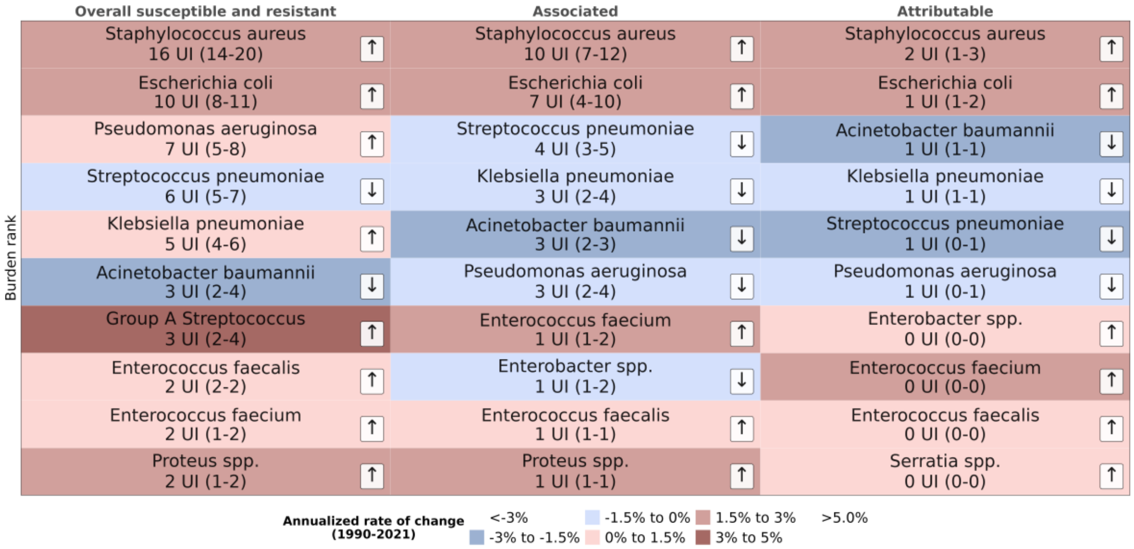
- Antimicrobial Resistance (AMR) is a major global health threat, over *a million lives* have been lost each year since 1990.
- Globally, 4.71 (95% Uncertainty Interval (UI) 4.2-5.2) million deaths were associated with bacterial drug-resistant infections in 2021.
- And 1.14 (UI 1 - 1.3) million deaths were attributable to bacterial drug-resistant infection in the same year.
- *39 (UI 33 - 46) million deaths* directly attributable to bacterial AMR are projected to occur between 2025-2050 unless concerted action is taken. This equates to three deaths every minute.

Figure 2 Comparing 30 years of infection related deaths, and those associated with and attributable to AMR in Bermuda between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation (MICROBE)]
- In **Bermuda** in 2021, there were an estimated **8 UI (5-11)** deaths attributable to AMR and **37 UI (26-47)** deaths associated with AMR. Here *"attributable deaths"* are considered to be those that would have been prevented had the drug-resistant bacteria causing the infections not been drug-resistant. *"Associated deaths"* are considered to be those that would not have occurred had the infections been prevented entirely.
- Across 204 countries, **Bermuda has the 32nd lowest** age-standardized mortality rate associated with AMR in 2021.
- *Table 1* shows the bacteria which caused most deaths in 2021 (↑ indicates an increasing estimated annual rate between 1990-2021, ↓ indicates a decreasing annual trend), and *table 2* shows the pathogen-drug combinations which caused most deaths in 2021.

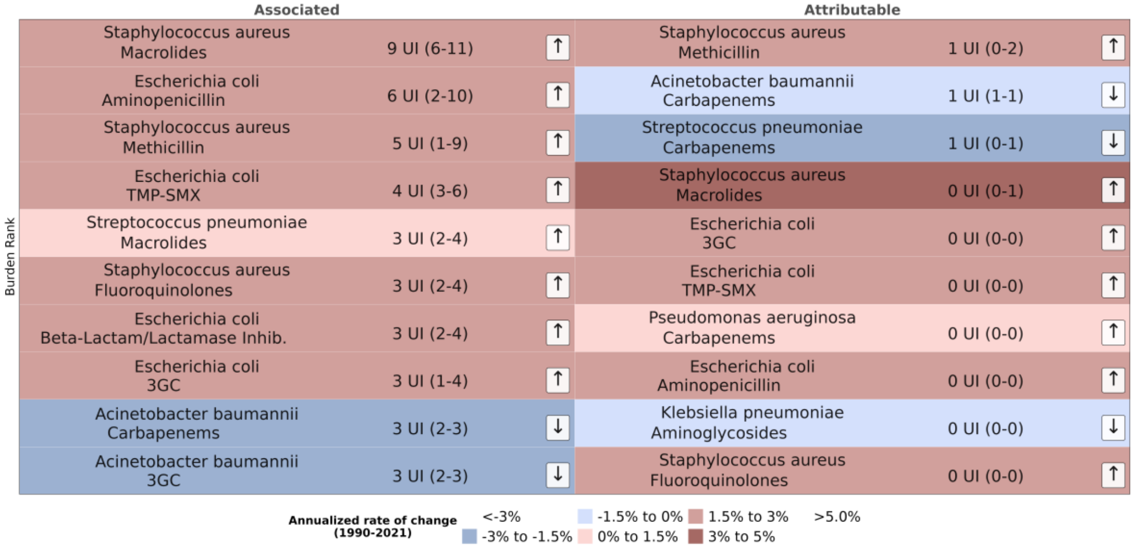
Table 1. Bacteria which cause most deaths in 2021 (Number of deaths in parenthesis)



Overall susceptible and resistant	Associated	Attributable
Staphylococcus aureus 16 UI (14-20) ↑	Staphylococcus aureus 10 UI (7-12) ↑	Staphylococcus aureus 2 UI (1-3) ↑
Escherichia coli 10 UI (8-11) ↑	Escherichia coli 7 UI (4-10) ↑	Escherichia coli 1 UI (1-2) ↑
Pseudomonas aeruginosa 7 UI (5-8) ↑	Streptococcus pneumoniae 4 UI (3-5) ↓	Acinetobacter baumannii 1 UI (1-1) ↓
Streptococcus pneumoniae 6 UI (5-7) ↓	Klebsiella pneumoniae 3 UI (2-4) ↓	Klebsiella pneumoniae 1 UI (1-1) ↓
Klebsiella pneumoniae 5 UI (4-6) ↑	Acinetobacter baumannii 3 UI (2-3) ↓	Streptococcus pneumoniae 1 UI (0-1) ↓
Acinetobacter baumannii 3 UI (2-4) ↓	Pseudomonas aeruginosa 3 UI (2-4) ↓	Pseudomonas aeruginosa 1 UI (0-1) ↓
Group A Streptococcus 3 UI (2-4) ↑	Enterococcus faecium 1 UI (1-2) ↑	Enterobacter spp. 0 UI (0-0) ↑
Enterococcus faecalis 2 UI (2-2) ↑	Enterobacter spp. 1 UI (1-2) ↓	Enterococcus faecium 0 UI (0-0) ↑
Enterococcus faecium 2 UI (1-2) ↑	Enterococcus faecalis 1 UI (1-1) ↑	Enterococcus faecalis 0 UI (0-0) ↑
Proteus spp. 2 UI (1-2) ↑	Proteus spp. 1 UI (1-1) ↑	Serratia spp. 0 UI (0-0) ↑

Annualized rate of change (1990-2021)
<-3%
-3% to -1.5%
-1.5% to 0%
0% to 1.5%
1.5% to 3%
3% to 5%
>5.0%

Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)



Associated			Attributable		
Staphylococcus aureus Macrolides	9 UI (6-11)	↑	Staphylococcus aureus Methicillin	1 UI (0-2)	↑
Escherichia coli Aminopenicillin	6 UI (2-10)	↑	Acinetobacter baumannii Carbapenems	1 UI (1-1)	↓
Staphylococcus aureus Methicillin	5 UI (1-9)	↑	Streptococcus pneumoniae Carbapenems	1 UI (0-1)	↓
Escherichia coli TMP-SMX	4 UI (3-6)	↑	Staphylococcus aureus Macrolides	0 UI (0-1)	↑
Streptococcus pneumoniae Macrolides	3 UI (2-4)	↑	Escherichia coli 3GC	0 UI (0-0)	↑
Staphylococcus aureus Fluoroquinolones	3 UI (2-4)	↑	Escherichia coli TMP-SMX	0 UI (0-0)	↑
Escherichia coli Beta-Lactam/Lactamase Inhib.	3 UI (2-4)	↑	Pseudomonas aeruginosa Carbapenems	0 UI (0-0)	↑
Escherichia coli 3GC	3 UI (1-4)	↑	Escherichia coli Aminopenicillin	0 UI (0-0)	↑
Acinetobacter baumannii Carbapenems	3 UI (2-3)	↓	Klebsiella pneumoniae Aminoglycosides	0 UI (0-0)	↓
Acinetobacter baumannii 3GC	3 UI (2-3)	↓	Staphylococcus aureus Fluoroquinolones	0 UI (0-0)	↑

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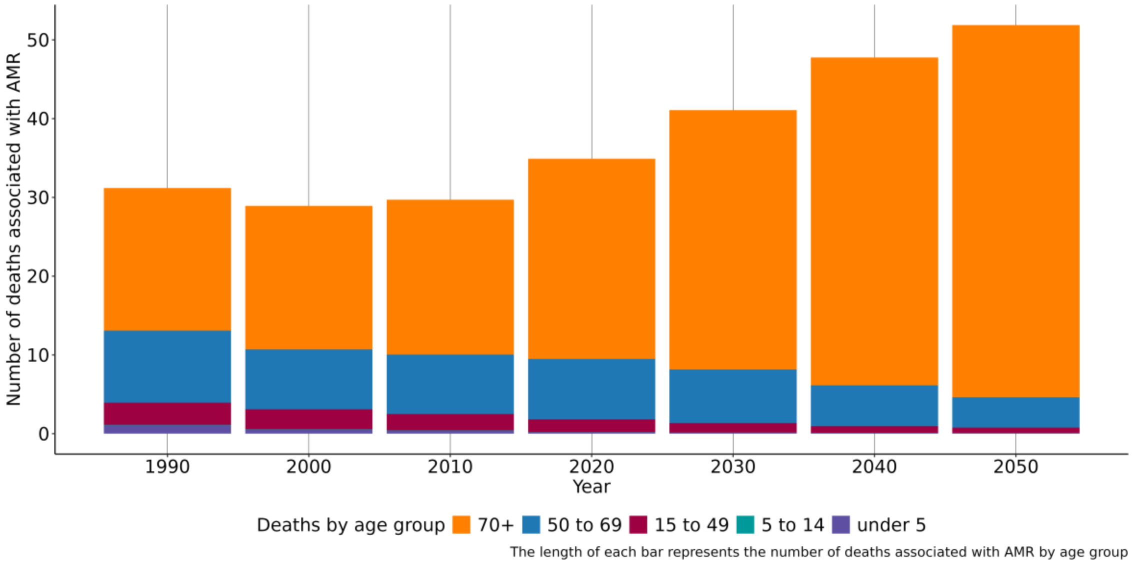
- Independently of antimicrobial resistance, the infectious syndromes accounting for the most deaths in 2021 were as follows (estimated thousands of deaths in parenthesis) bloodstream infections (33 UI (27-39)), lower respiratory infection (excl. COVID) (32 UI (26-38)), peritoneal and intra-abdominal infections (8 UI (6-10)), urinary tract infections and pyelonephritis (6 UI (5-8)) and infections of the skin and subcutaneous systems (6 UI (5-7)).

Figure 3. Number of deaths associated with AMR by age group between 1990-2020 and 2050 projection



- In Bermuda, people aged 70+ saw the largest number of deaths associated with AMR both in 1990 and 2021, which indicates that 70+ continues to be particularly vulnerable to infections which are resistant to antibiotics. In 2021, the number of deaths associated with AMR among the 70+ was 27 UI (19-34), whereas the mortality rate per 100,000 was 297 UI (214-380).

Data sources for Bermuda

In total, 520 million individual records or isolates covering 19,513 study-location-years were used as input data to our estimation process. There was no input data accessible for this country. Estimates were informed by results from the Global Burden of Disease study and data from the surrounding region. Any datasets that could be used to improve these estimates in the future are welcome.

Table 3. Data inputs for Bermuda by source type

Source type	Years	Sample size	Sample size units
No other source but GBD study input	None		GBD study input

More information

About GRAM:

The purpose of the Global Research on AntiMicrobial resistance (GRAM) project is to **generate accurate and timely estimates of the magnitude and trends in antimicrobial resistance (AMR) burden** across the world, which can be used to inform treatment guidelines and agendas for decision-making and research, detect emerging problems and monitor trends to inform global strategies, as well as facilitate the assessment of interventions over time.

GRAM is the flagship project of the University of Oxford–IHME Strategic Partnership. GRAM was launched with support from the United Kingdom Department of Health and Social Care's Fleming Fund, and the Wellcome Trust.

All resources:

For all resources on AMR analysis at IHME, visit https://www.healthdata.org/antimicrobial-resistance.

To look at these and more visualization interactively visit Measuring Infectious Causes and Resistance Outcomes for Burden Estimation (MICROBE).

Data sources:

To download the list of data input sources by country, and AMR results by region, visit the Global Health Data Exchange (GHDx).

Contact us:

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