



Arkansas Department of Health

Antimicrobial Stewardship in Arkansas

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Disclosure

I, Jordan Murdoch, have no actual or potential conflict of interest in relation to this program/presentation



Definitions

- **Antimicrobial** – all agents that act (kill or prevent further growth) against all types of microorganisms
 - **Antibiotic** – act against bacteria
 - **Antiviral** – act against viruses
 - **Antifungal** – act against fungi
- **Resistance** – the ability of a microorganism to stop an antimicrobial from working against it
- **Stewardship** – the careful and responsible management of something entrusted to one's care

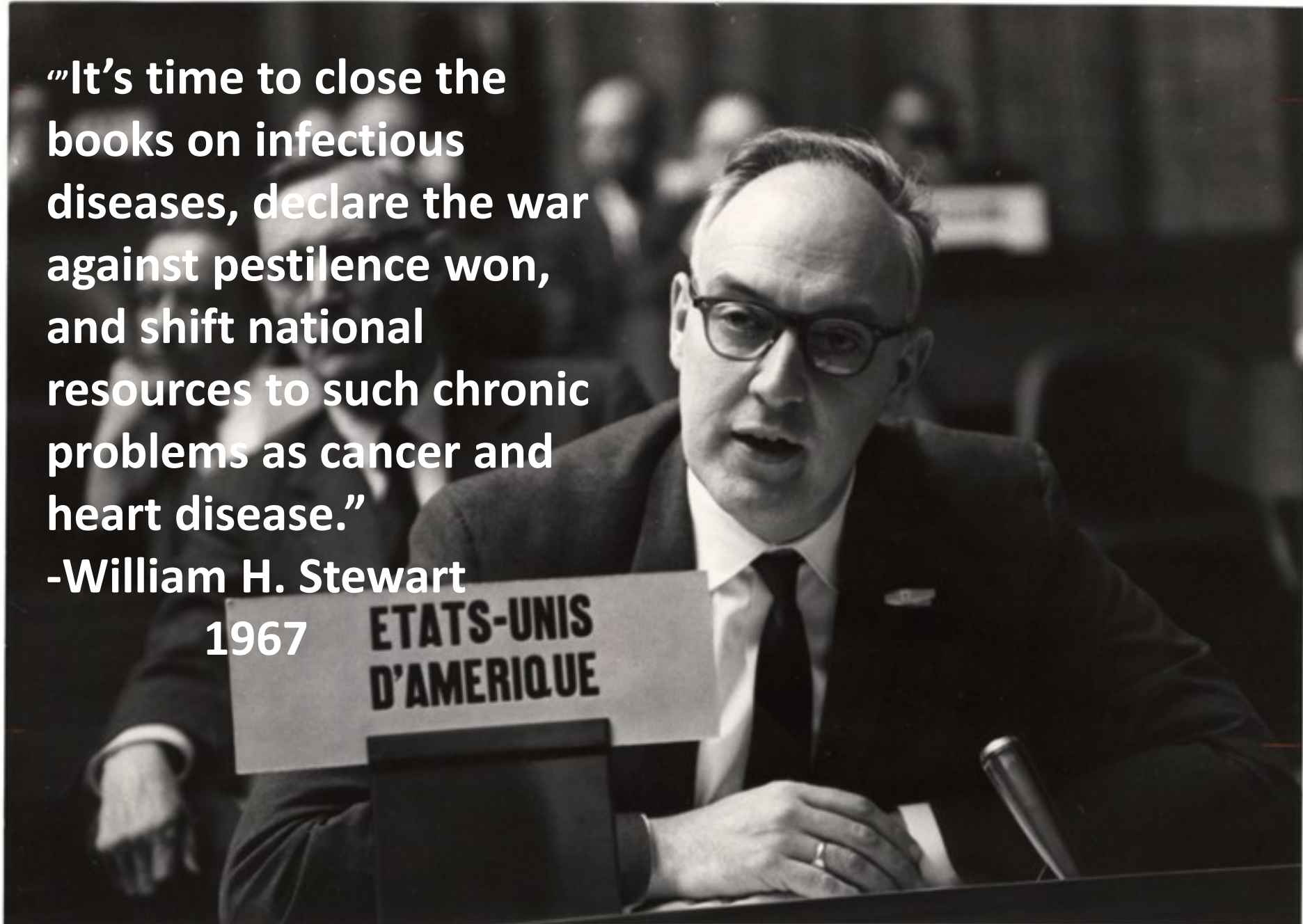


“It’s time to close the books on infectious diseases, declare the war against pestilence won, and shift national resources to such chronic problems as cancer and heart disease.”

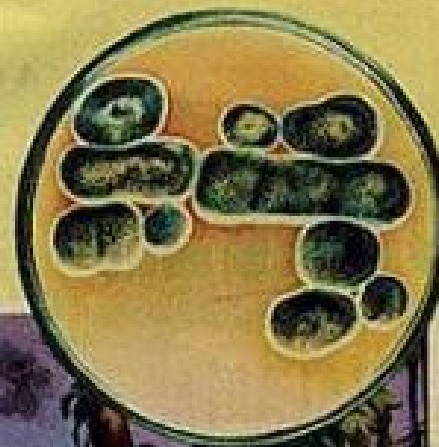
-William H. Stewart

1967

**ETATS-UNIS
D'AMERIQUE**



Thanks to PENICILLIN
...He Will Come Home!





© CORBIS



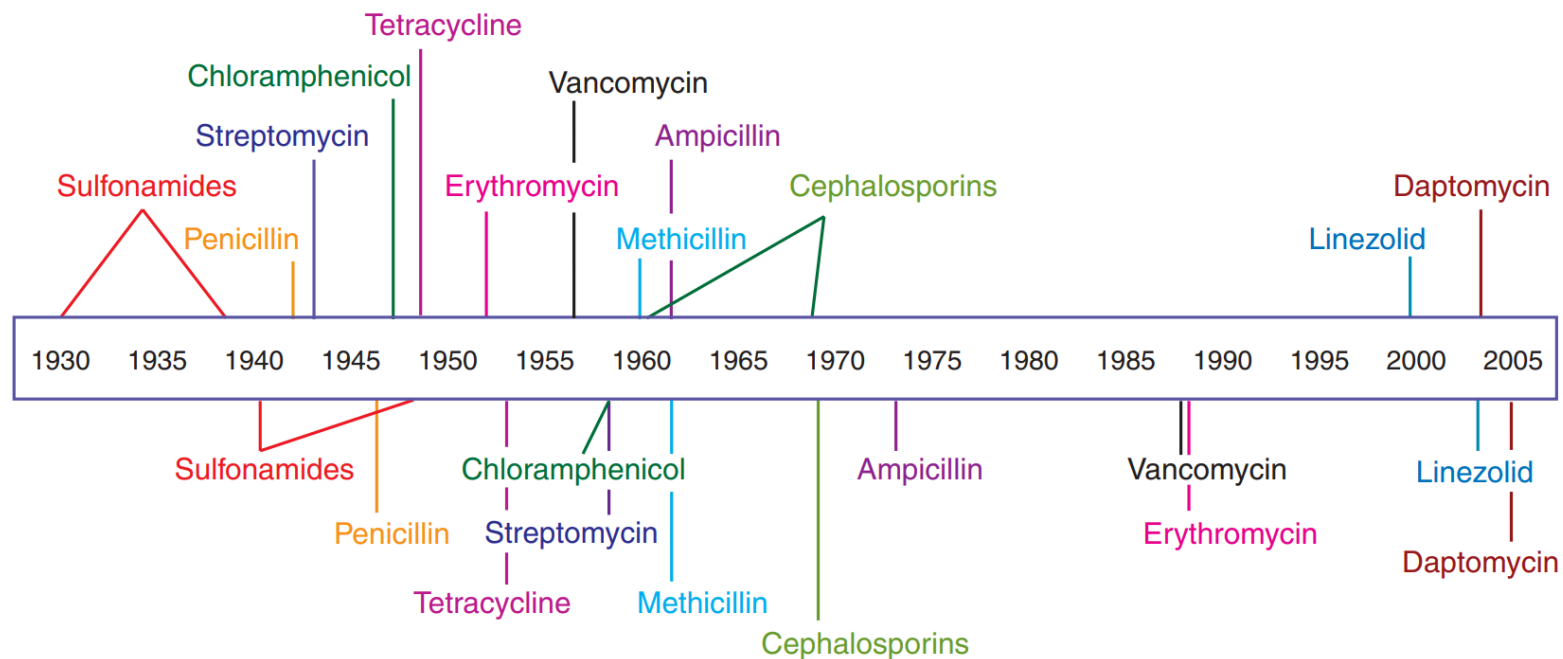


“It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body. The time may come when penicillin can be bought by anyone in the shops. Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant.”

-Alexander Fleming




Antibiotic deployment



Antibiotic resistance observed

Figure 1 Timeline of antibiotic deployment and the evolution of antibiotic resistance. The year each antibiotic was deployed is depicted above the timeline, and the year resistance to each antibiotic was observed is depicted below the timeline (with the caveat that the appearance of antibiotic resistance does not necessarily imply that a given antibiotic has lost all clinical utility).



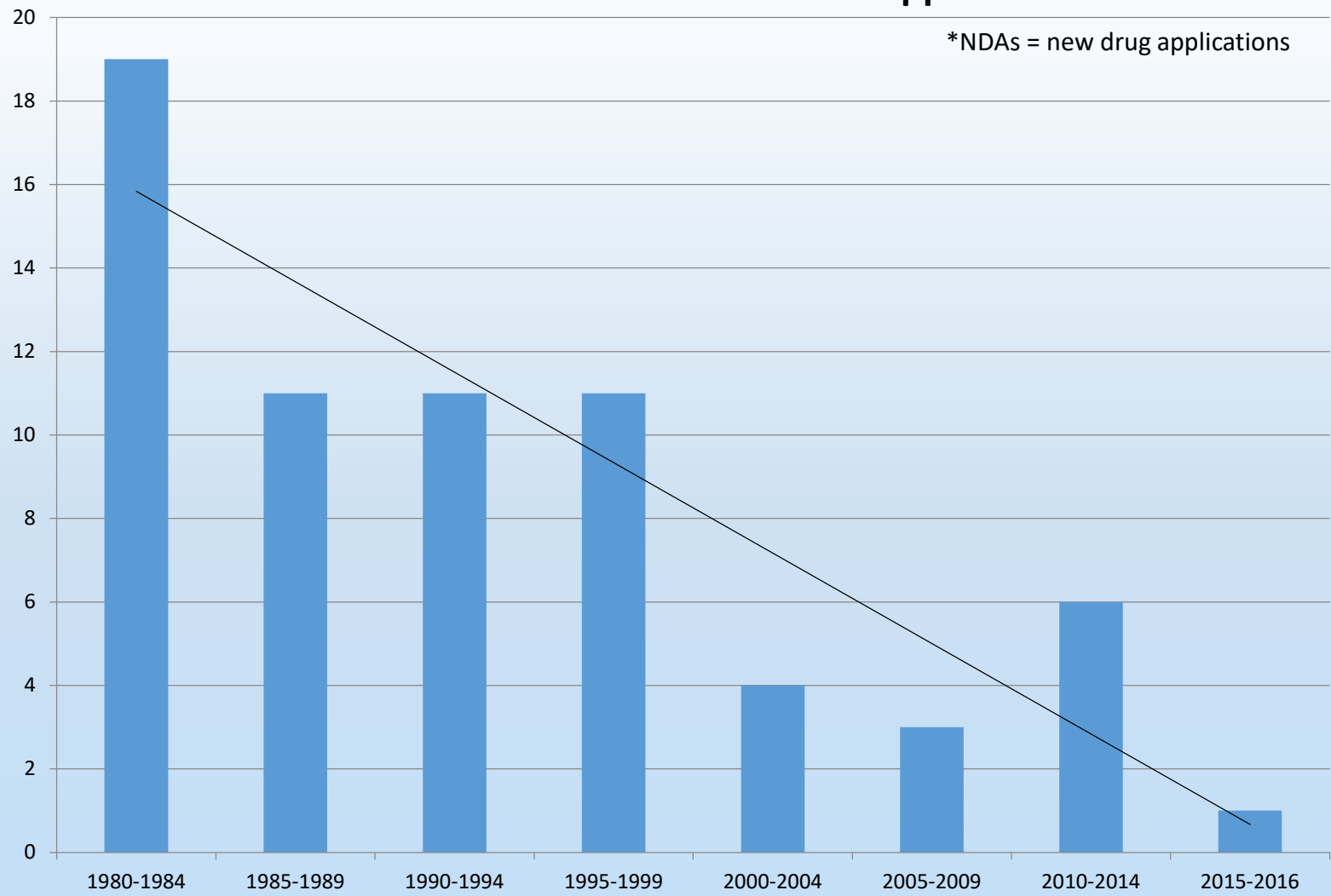
“Without urgent, coordinated action by many stakeholders, the world is headed for a post-antibiotic era, in which common infections and minor injuries which have been treatable for decades can once again kill.”

- Dr. Keiji Fukuda
Assistant Director-General, WHO (2010-2016)

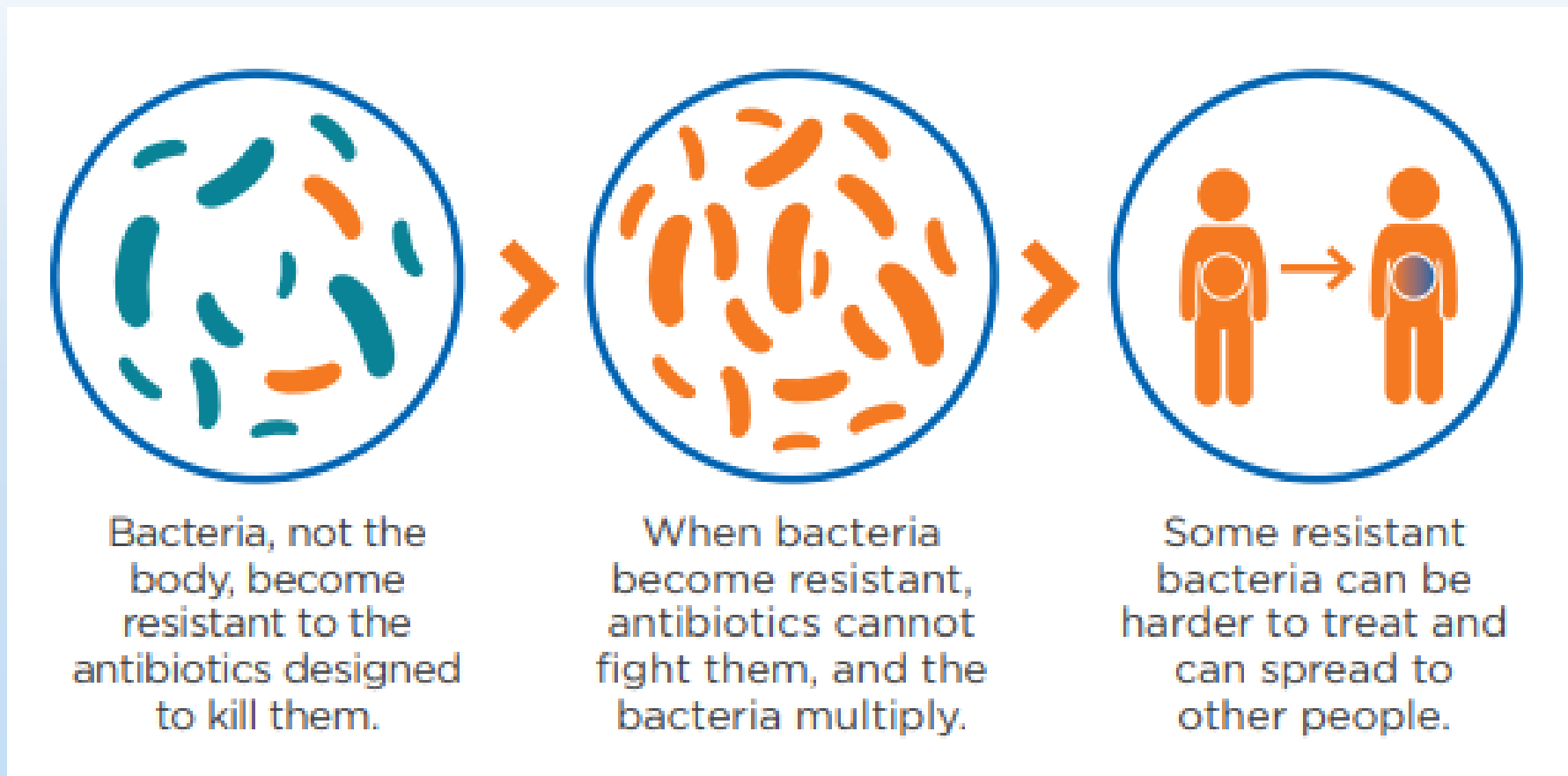




Number of Antibacterial NDAs* Approved



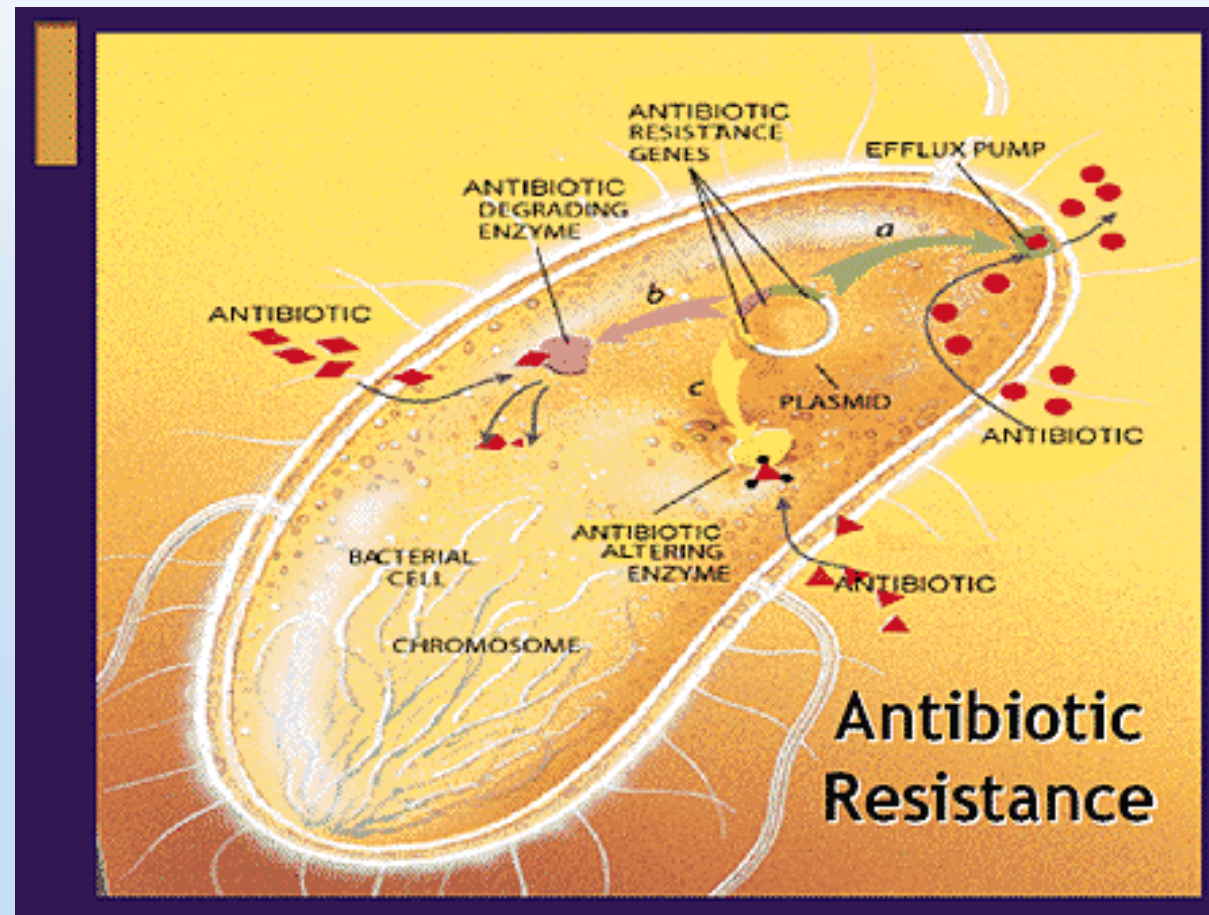
How do bacteria become resistant?



CDC. What is antibiotic-resistant bacteria?. [Accessed on 9/1/2018]. Graphic located at https://www.cdc.gov/antibiotic-use/community/pdfs/aaw/AU_What-is-antibiotic-resistant-Infographic_8_5x5_5_3_508.pdf.

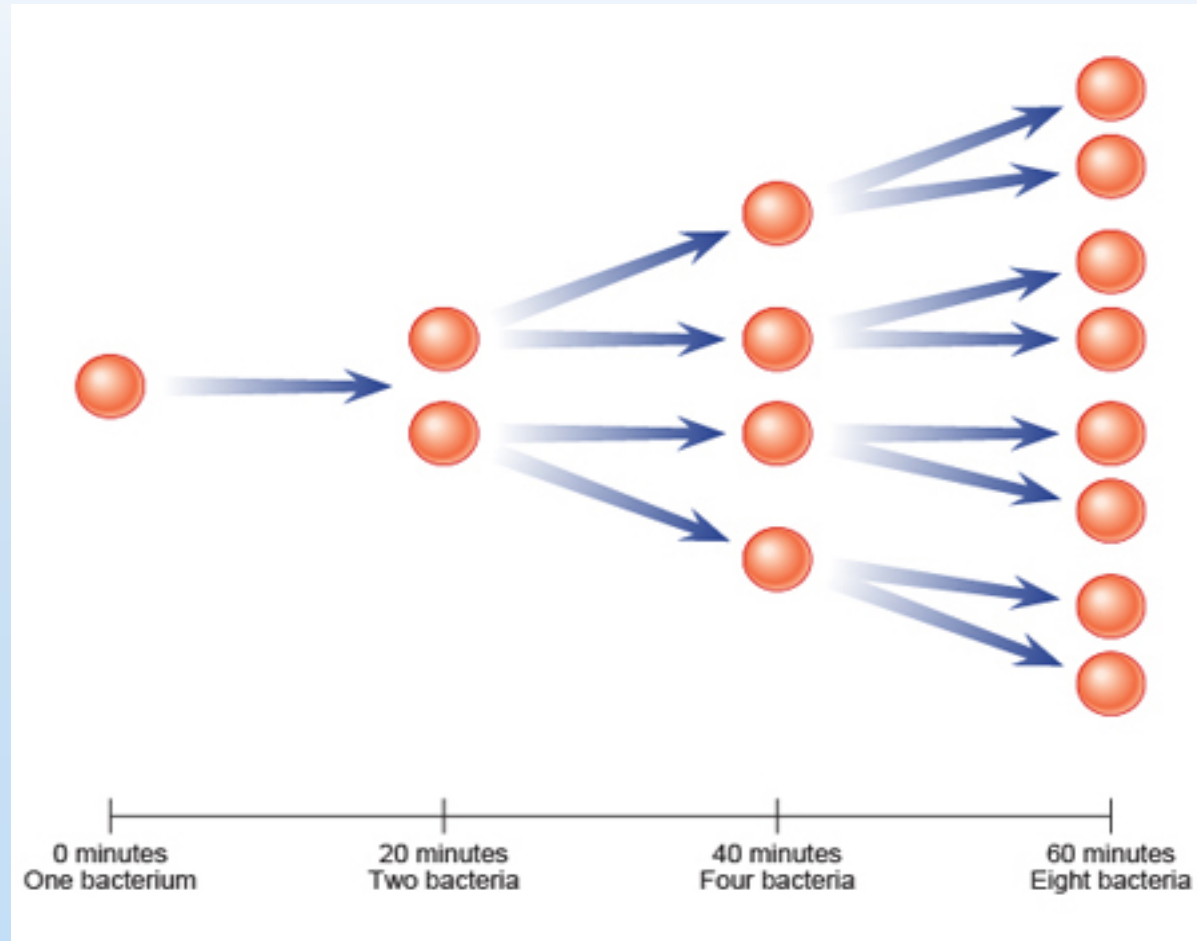
How do bacteria become resistant?

- Random gene mutation
- Sharing genetic material through plasmids
- Plasmids are small portions of DNA that encode a particular trait



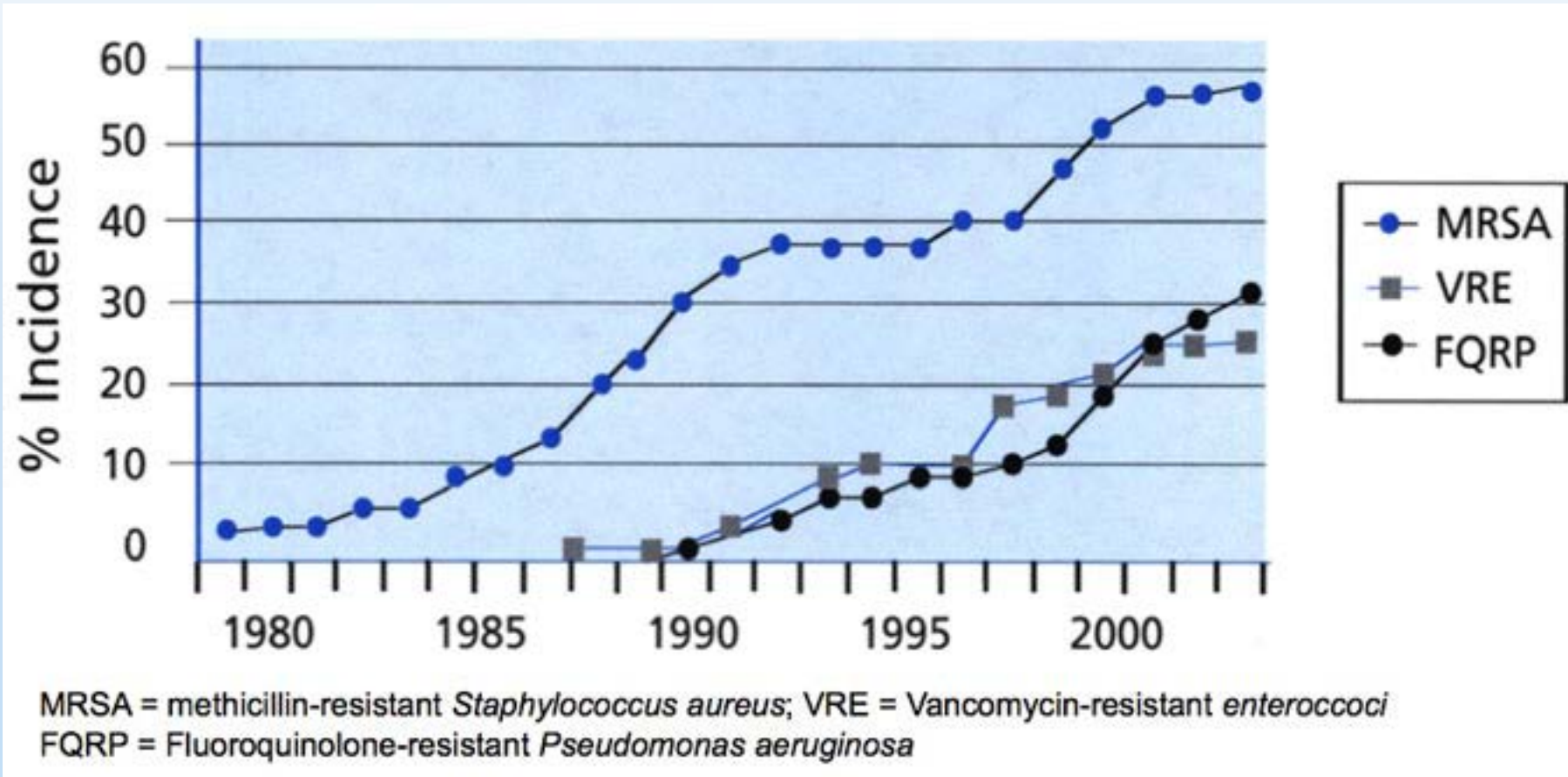
<http://images.medscape.com/pi/editorial/cmecircle/2002/1692/kollef/slide03.gif>

How fast do bacteria multiply?



http://www.bbc.co.uk/schools/gcsebitesize/science/images/21c_bio_microorganisms.jpg

Increase in Antibiotic Resistance



Centers for Disease Control and Prevention (CDC) 2019 Threat Report



Urgent Threats

These germs are public health threats that require urgent and aggressive action:

-  CARBAPENEM-RESISTANT **ACINETOBACTER**
-  **CANDIDA AURIS**
-  **CLOSTRIDIoidES DIFFICILE**
-  CARBAPENEM-RESISTANT **ENTEROBACTERIACEAE**
-  DRUG-RESISTANT **NEISSERIA GONORRHOEAE**



Antibiotic Resistance

The Threat of Antibiotic Resistance in the United States

Antibiotic resistance—when germs (bacteria, fungi) develop the ability to defeat the antibiotics designed to kill them—is one of the greatest global health challenges of modern time.

New National Estimate*

Each year, antibiotic-resistant bacteria and fungi cause at least an estimated:

 **2,868,700** infections

 **35,900** deaths



*Clostridioides difficile*** is related to antibiotic use and antibiotic resistance:

 **223,900** cases

 **12,800** deaths

New Antibiotic Resistance Threats List

Updated urgent, serious, and concerning threats—totaling 18

5 urgent threats

2 new threats

NEW: Watch List with **3** threats



Antibiotic resistance remains a significant One Health problem, affecting humans, animals, and the environment. Data show infection prevention and control is saving lives—especially in hospitals—but threats may undermine this progress without continued aggressive action now.

Learn more: www.cdc.gov/DrugResistance/Biggest-Threats.html

*National burden reflects de-duplicated infection and death estimates.
***Clostridioides difficile* cases from hospitalized patients in 2017
Revised Dec. 2019





Four Core Actions to Prevent Resistance

- Preventing infections
- Tracking
- Improving antimicrobial prescribing/stewardship
- Developing new drugs and diagnostic tests

Arkansas Activities to Address Core Actions

- **Preventing infections**
 - Conducting Infection Control Assessment and Readiness (ICAR) visits
 - ~130 on-site visits to healthcare facilities in 3 years
 - Promoting vaccinations
 - Targeting outreach to facilities with higher numbers of healthcare-associated infections
- **Tracking**
 - Implementing standard surveillance for antibiotic resistant pathogens, especially for the urgent category
 - Identifying important resistant mechanisms at the state public health laboratory
- **Improving antimicrobial prescribing/stewardship**
 - Providing education to prescribers
 - Analyzing antimicrobial prescribing patterns across the state by working with key partners



What is Antimicrobial Stewardship?

- Definition (IDSA):
 - Antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobials by promoting the selection of the optimal antimicrobial drug regimen, dose, duration of therapy, and route of administration
- Antibiotics are a shared resource
- 5 Ds: Right Diagnosis, Drug, Dose, Duration, and De-escalation