Antimicrobial Resistance in Hospitals: Lack of Effective Treatment for Gram Negative Bacilli and the Rise of Resistant *Clostridium difficile* Infections

Dale N. Gerding, MD

Chair, National and Global Public Health Committee, Infectious Diseases Society of America

The comments and statements of the presenter are his own and those of the Infectious Diseases Society of America and do not officially represent the views or position of the United States Department of Veterans Affairs or Loyola University Chicago Stritch School of Medicine.

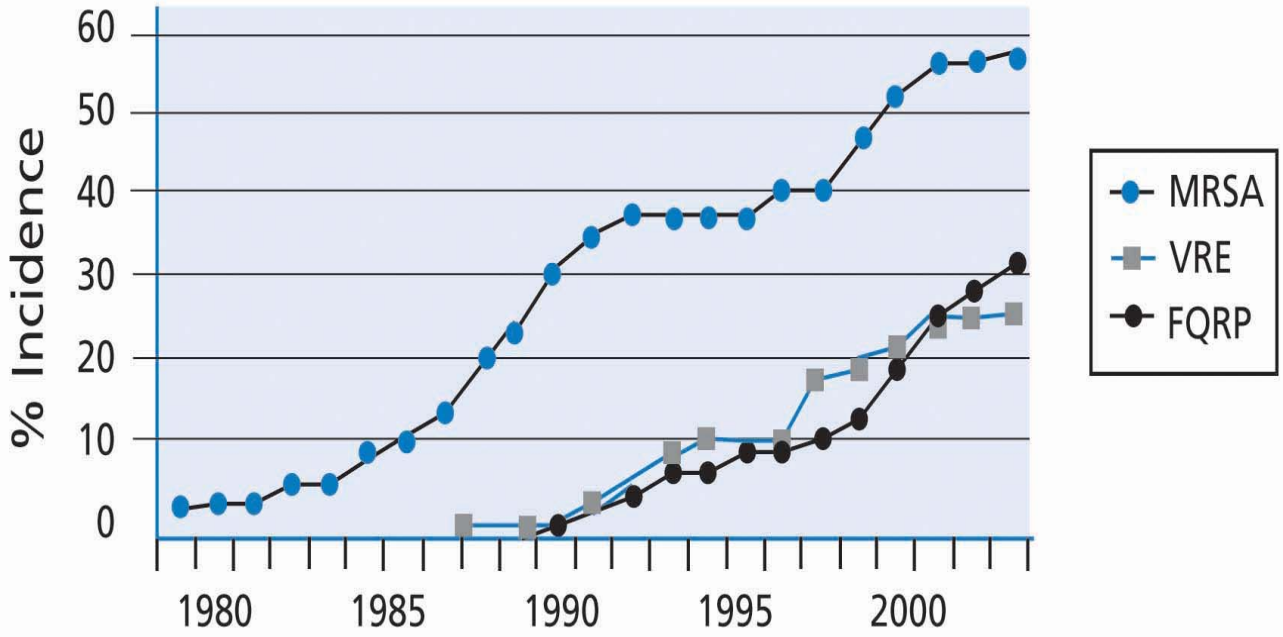
The Infectious Diseases Society of America (IDSA) represents more than 8,000 infectious diseases physicians, researchers, and other health care professionals dedicated to promoting health through excellence in infectious diseases research, education, prevention, and patient care. IDSA is here today on behalf of the patients we care for.

Presentation Objectives

- Alert the audience to the rise in severe cases of *Clostridium difficile* associated diarrhea (CDAD) resistant to fluoroquinolone antibiotics in US and Canadian hospitals
- Describe continued increased resistance among gram-negative bacteria in hospitals resulting in lack of effective therapies
- Support legislative initiatives to improve these antimicrobial resistance problems

Why Is IDSA Concerned?

Resistant Bacterial Strains Spread Rapidly



Resistance Among Gram Negative Bacilli is Rising

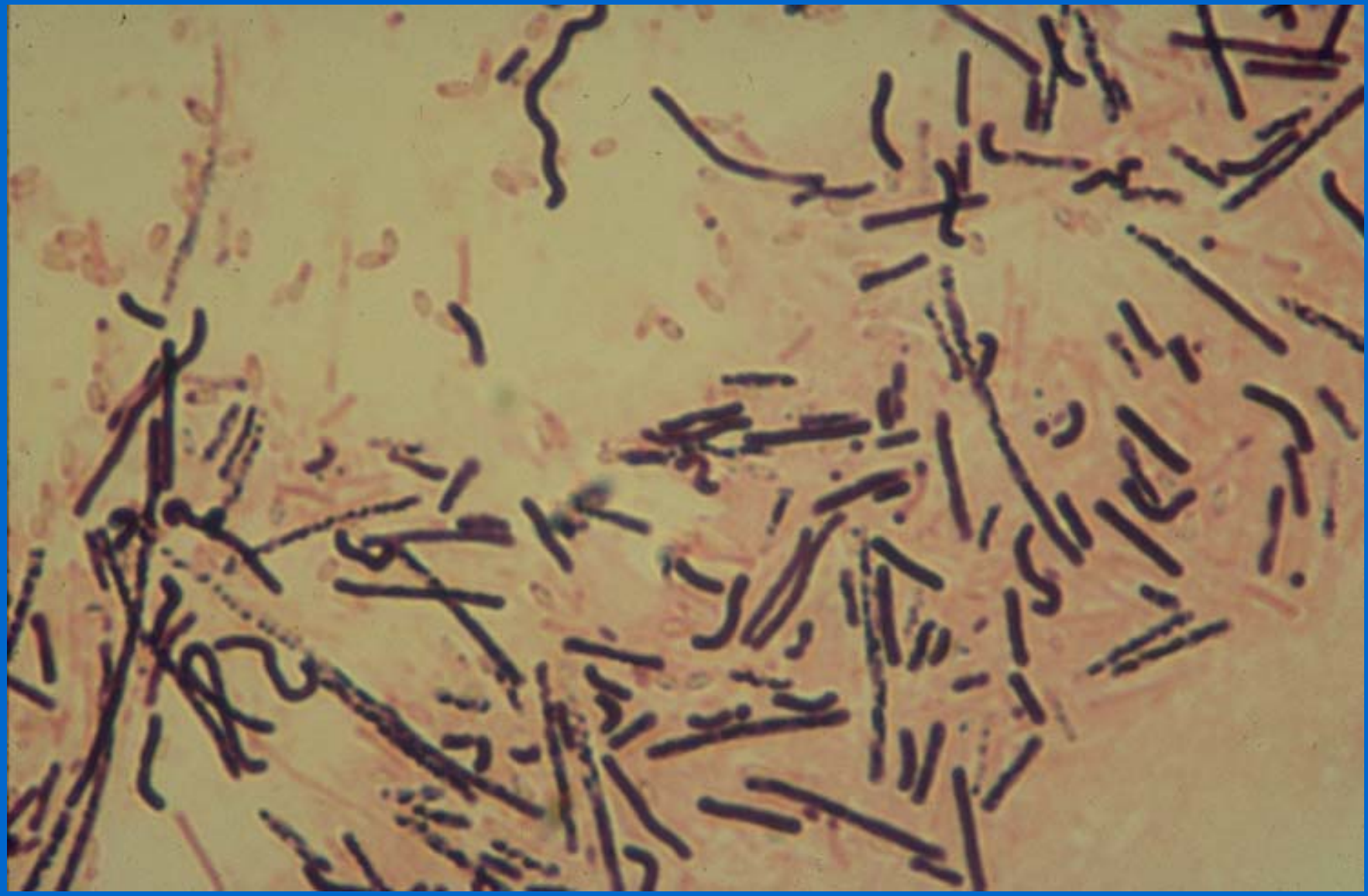
- Organisms such as *E. coli*, Klebsiella, Enterobacter, Acinetobacter and Pseudomonas cause abdominal, urinary, respiratory, and bloodstream infections in hospitalized patients.
- Resistance to most antimicrobial classes including cephalosporins, penicillins, carbapenems, aminoglycosides, and fluoroquinolones has increased markedly resulting in the increasing need to treat these organisms with a last resort, 1950s, toxic antimicrobial, colistin.
- Incentives for new drug development for the treatment of gram-negative bacilli are needed now.

Stelling et al, Emerging Infectious Diseases, June 2005

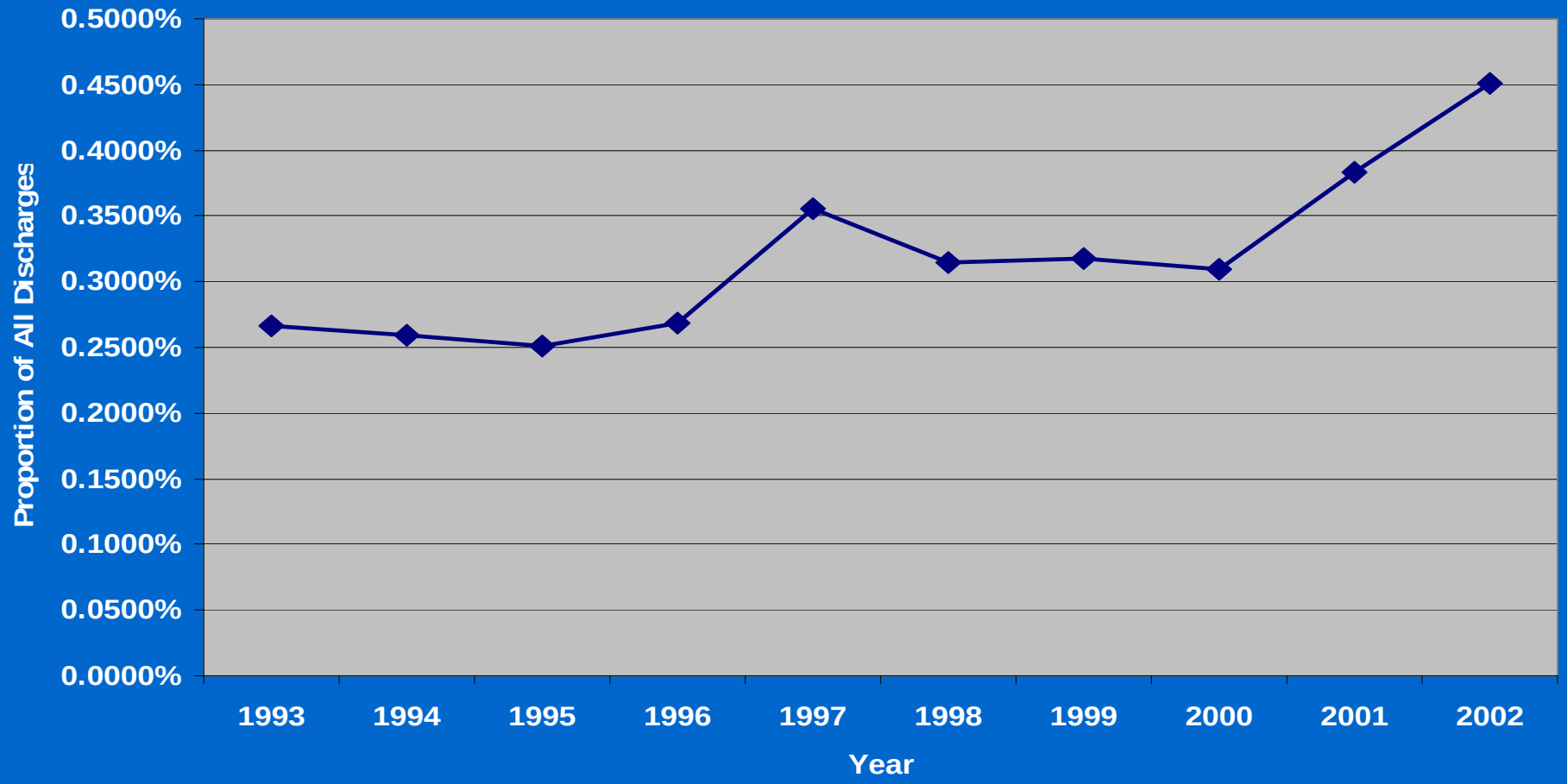
Clostridium difficile-Associated Diarrhea (CDAD) - What is it?

- An infection that causes diarrhea and severe colitis (inflammation of the colon) in patients who have taken antibiotics.
- The cause is a bacteria that lives in soil, water, and the hospital environment where it exists as a spore that is resistant to cleaning agents, heat, and drying.
- Patients acquire *C. difficile* infection from contact with their surroundings or hospital employees who carry the bacteria on their hands if they are not following good hand hygiene practices.

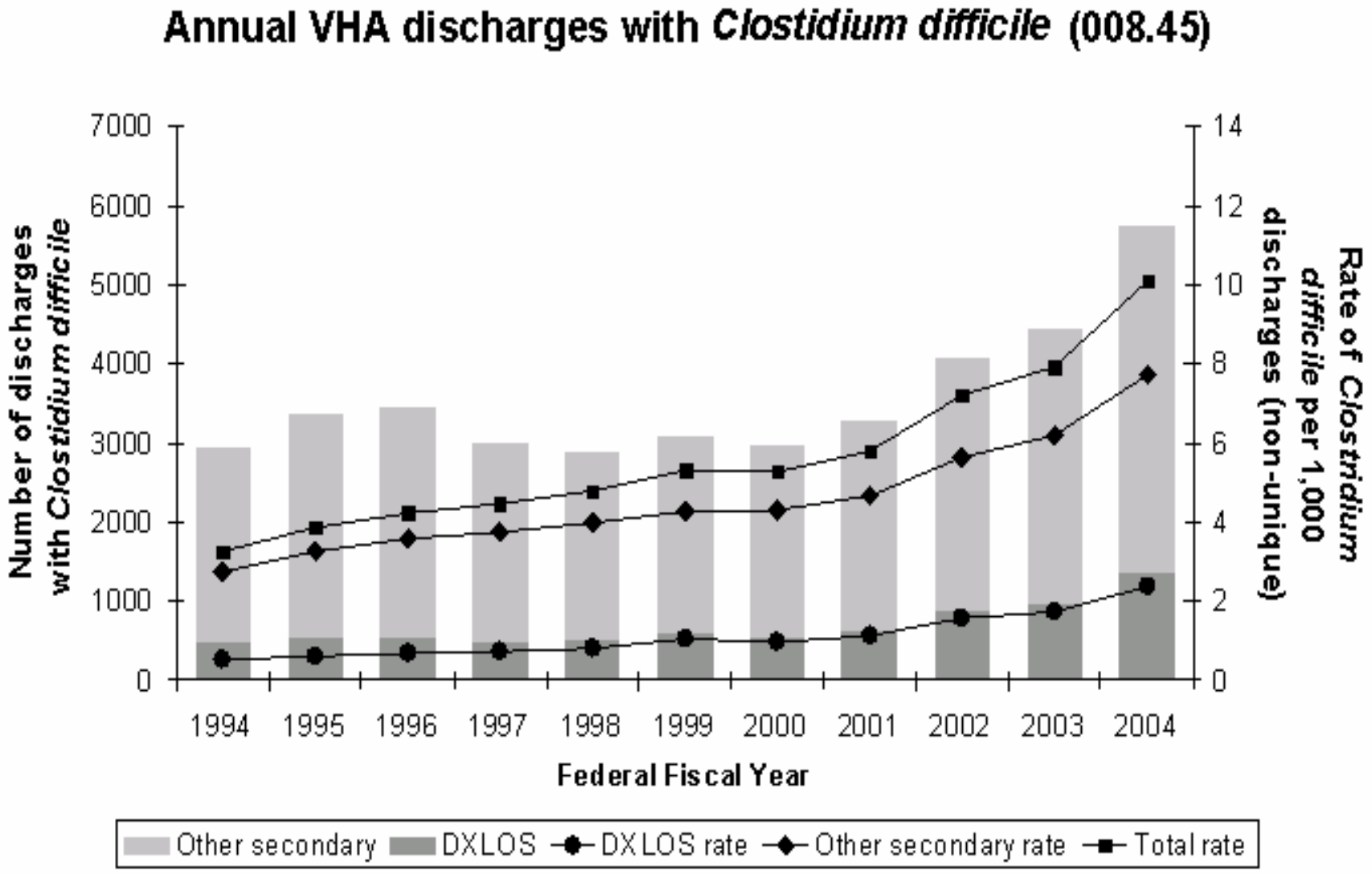
C. difficile Vegetative Cells and Spores



Proportion of U.S. Acute Care Hospital Discharges with Clostridium difficile Listed as Any Diagnosis

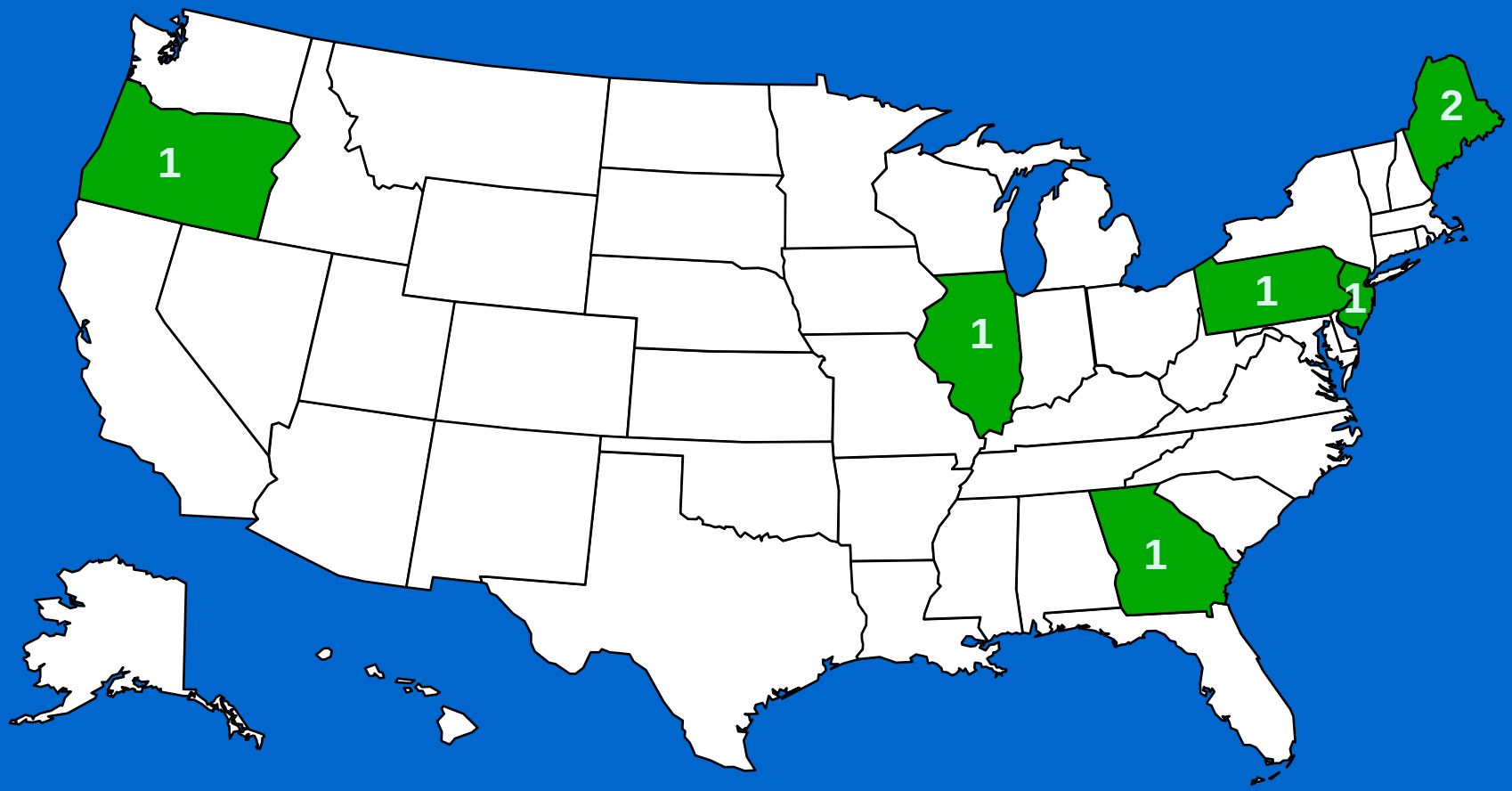


McDonald et al. 14th Annual Scientific Meeting of the Society for Healthcare Epidemiology of America, Philadelphia, PA. 2004



Kralovic et al, Society for Healthcare Epidemiology of America Ann Mtg, 2005

Acute Care Hospitals with CDAD Outbreaks Caused by a New Resistant Strain Between 2001 and 2004



McDonald et al 2004 IDSA Ann Mtg, Boston

The Elderly have the Highest Risk of CDAD

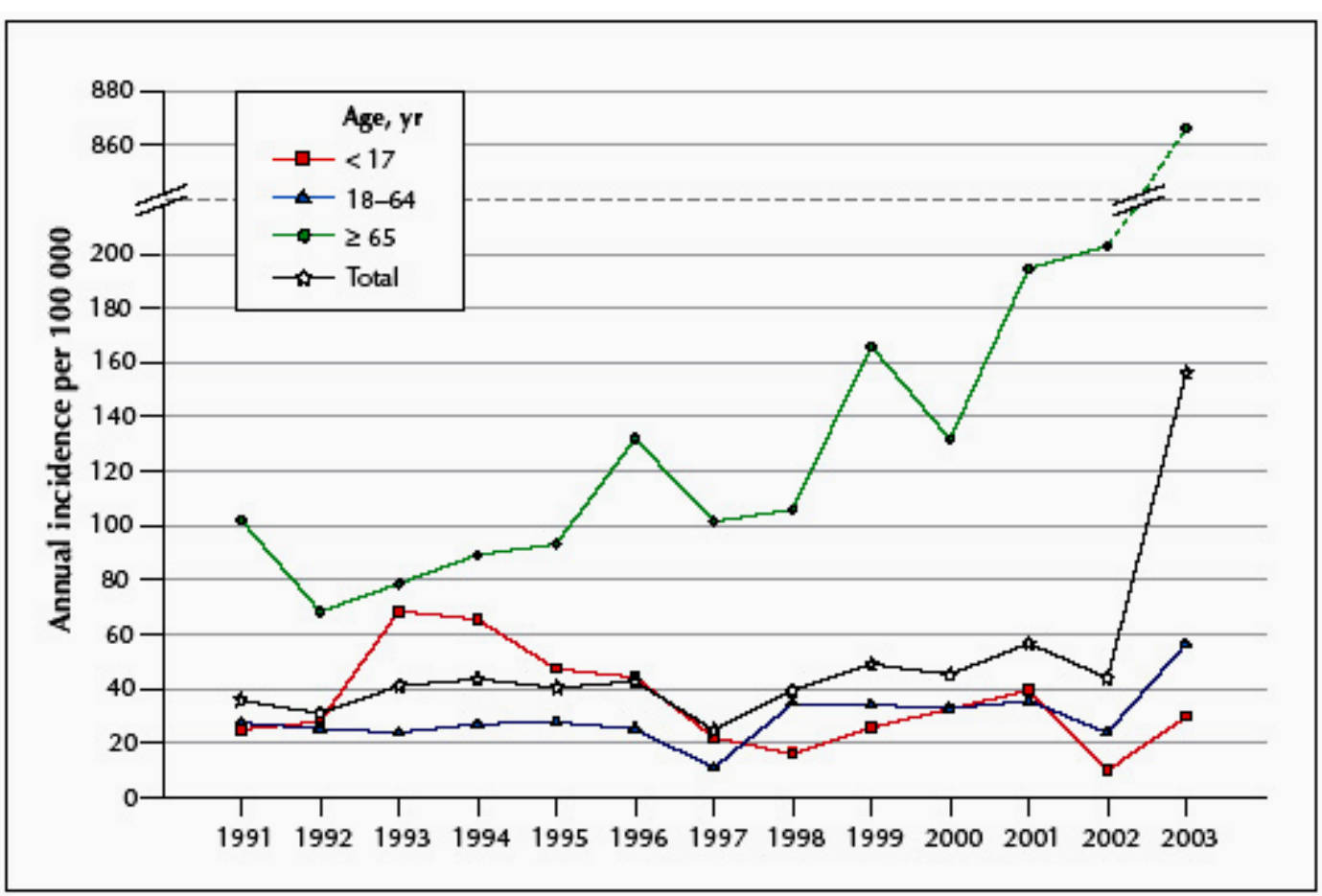


Fig. 1: Annual incidence (per 100 000 population) of *Clostridium difficile*-associated diarrhea (CDAD) in Sherbrooke, Que., 1991–2003.

Pepin et al
CMAJ
2004;171:466

The *C. difficile* Diarrhea Problem: Increasing Morbidity and Mortality

- 2,334 cases in a Pittsburgh hospital over 12 years
  - Incidence increased from 6.8/1000 discharges 1989-99 to 11.6/1000 discharges in 2000
  - **Life threatening in 3.2%: 20 deaths and 44 colectomies**

Dallal et al Ann Surgery 2002;235:363-372

- Hospitals in Quebec report CDAD rates of 28/1000 admissions, a 4 to 5 fold increase in 2 years and a **30-day mortality increase following CDAD from 4.7% to 13.8%.**

Loo et al CMAJ 2004;171:466-472

The *C. difficile* Associated Diarrhea Problem: Increasing Cost

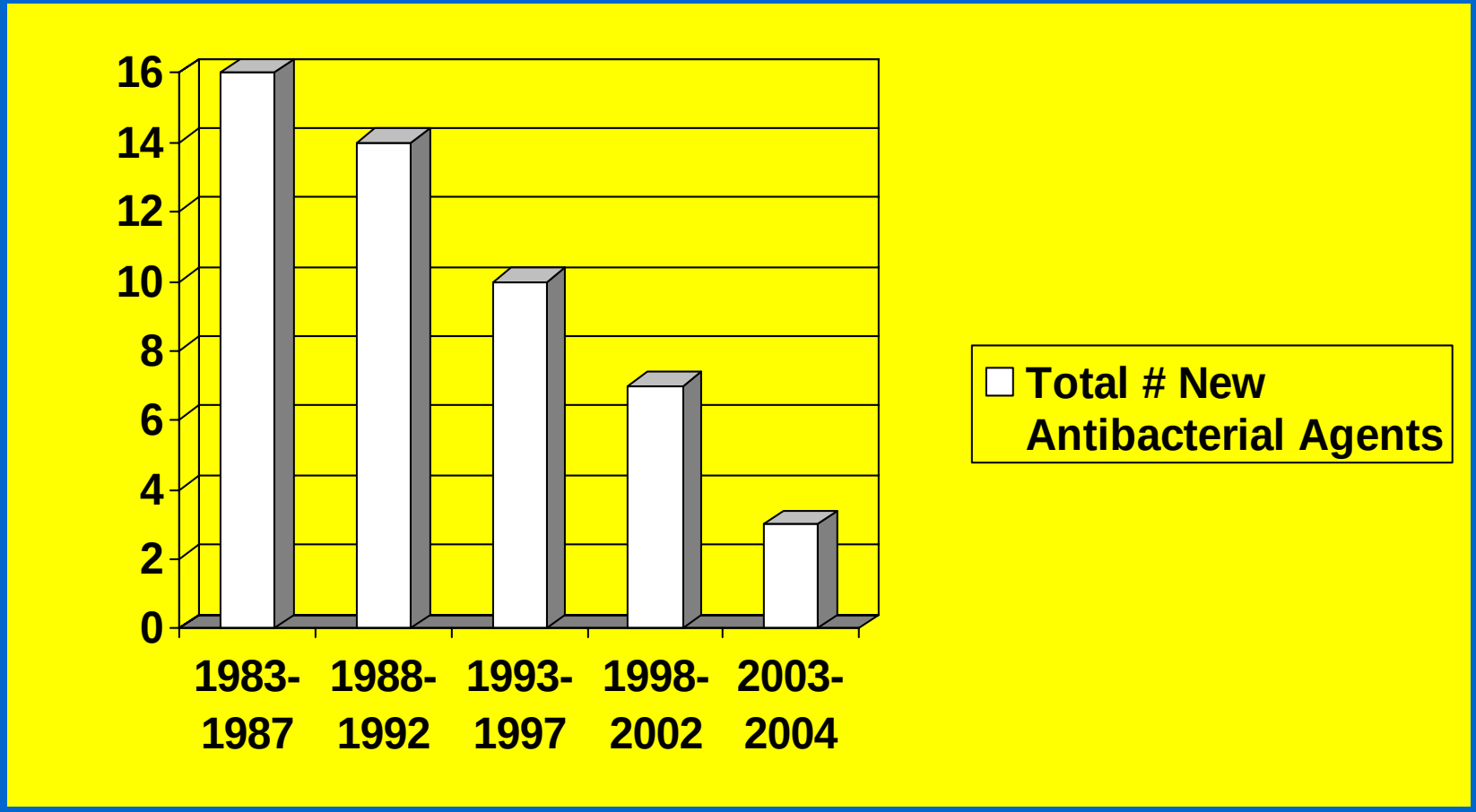
- Additional hospital costs of $3,669 per patient and 3.6 extra days of hospitalization.
- U.S. annual excess hospital healthcare cost of *C. difficile* disease is estimated at **$1.1 billion**.

Kyne et al Clinical Infectious Diseases 2002;34:346-53

Clostridium difficile: New Issues

- **CDAD rates are increasing, estimated >400,000 hospital cases annually in US.**
- **A common resistant epidemic *C. difficile* strain has been found in the US and Canada.**
- **More severe CDAD with higher mortality and higher rates of colectomy is being reported.**
- **The clinical effectiveness of metronidazole for treatment of CDAD is being questioned.**
- **Vancomycin remains the only FDA approved treatment agent for CDAD.**
- **There has not been a new antibiotic approved for CDAD treatment in ~20 years.**

Total Approved Antibacterials: US



Spellberg, et. al., *Clinical Infectious Diseases* May 1, 2004

IDSA
Infectious Diseases Society of America

Bad Bugs, No Drugs

www.idsociety.org

As Antibiotic Discovery Stagnates ...
A Public Health Crisis Advances

IDSA Position on Antimicrobial Resistance

- IDSA supports incentives for development of new antimicrobials, vaccines, and improved diagnostics for treating and diagnosing antimicrobial-resistant organisms
- IDSA supports S. 975, the Project BioShield II Act of 2005 and H.R. 3154, The Infectious Diseases Research and Development Act of 2005. Both bills provide incentives to stimulate pharmaceutical and biotechnology companies to invest in R&D for infectious disease treatment and prevention.
- IDSA encourages increased support for research, prevention and education to address the increasing threat of antimicrobial resistance.