

# **Clostridium Difficile and Norovirus: What is a medical director to do?**

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# Disclosures

- ▶ Karyn Leible has no financial disclosures

# Objectives

By attending this presentation the learner will be able to:

1. Relate 441 requirements regarding infection control surveillance and out break identification
2. Explore the medical directors role during out breaks of C. diff and norovirus

# Case 1

- ▶ You receive a call from the 60 bed facility where you are the medical director the administrator states that there are 6 facility managers and 8 residents ill with nausea vomiting and diarrhea in the past 24 hours. She wants to know what she should do. One of those ill is her director of nursing.

# Regulatory Mandate:

## 483.65 Infection Control

- ▶ F-Tag 441 (R) – Facility must:
  - establish and maintain an Infection Control Program
  - provide a safe, sanitary, comfortable environment
  - *Help* prevent development and transmission of disease and infection

# Infection Control Program

Must:

- ▶ Investigate, control, and prevent infections in the facility;
- ▶ Decide what procedures, such as isolation, should be applied to an individual resident; and
- ▶ Maintain a record of incidents and corrective actions related to infections.

# Components of an Infection Control Program

- ▶ Program development and oversight
- ▶ Policies and procedures
- ▶ Infection control practitioner
- ▶ Surveillance
- ▶ Documentation
- ▶ Monitoring
- ▶ Data analysis
- ▶ Communicable disease reporting
- ▶ Education
- ▶ Antibiotic review

# Preventing the spread of infection

- ▶ **( R)** The facility must require staff to wash their hands after each direct resident contact for which handwashing is indicated by accepted professional practice.
- ▶ **(IG)** Procedures must be followed to prevent cross contamination, including handwashing or changing gloves after providing personal care, or....
- ▶ **(IG)** Facilities for hand washing must be available

# Preventing the Spread of Infection

- ▶ When the infection control program determines that a resident needs isolation to prevent the spread of infection, the facility must isolate the resident
- ▶ The facility must prohibit employees with a communicable disease or infected skin lesions from direct contact with residents or their food, if that direct contact will transmit the disease.

# Case 2: Diarrhea outbreak

- ▶ You recommend isolation (remain in room, meals in room) for residents with diarrhea
- ▶ This is of course in addition to your ongoing “standard precautions” policy
- ▶ Your social worker says you can’t do that, it violates residents’ rights

# F-Tag 441

## Preventing the spread of infection

- ▶ ( R ) When the infection control program determines that a resident needs isolation to prevent the spread of infection, the facility must isolate the resident
- ▶ ( IG ) Isolate appropriately to reduce the risk of transmission

# F-Tag 441

## Preventing the spread of infection

- ▶ (IG) Isolate residents only to the degree needed to isolate the infecting organism
- ▶ (IG) Method should be the least restrictive possible while maintaining the integrity of the process

## F-Tag 441 Handwashing

- ▶ Your policy (and the SOM) says that the facility should follow the guidance for surveyors in F tag 441 for handwashing

# Infection Control

There is a **Guideline for Hand Hygiene in Health-Care Settings**, dated October 25, 2002 from the CDC

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5116a1.htm>

# Diarrhea outbreak

- ▶ This example is “real”
  - *In South Dakota between October 2, 2002 and January 8, 2003, 14% of 6093 residents became ill with acute gastrointestinal symptoms*
  - *In the facility, 56% of residents had gastrointestinal symptoms within a 9 day period at the end of December 2002*

# Diarrhea outbreak

- *Investigation by the state health department strongly suggested that the majority of these cases were related to Norovirus infection*
- *This is the same virus implicated in diarrheal outbreaks on cruise ships*

# Noroviruses

- Norovirus
- Norwalk-like viruses (NLVs)
- Caliciviruses (Caliciviridae)
- Small round structured viruses
- Snow Mountain virus

# Common Clinical Names

- Viral Gastroenteritis
- Acute non bacterial gastroenteritis
- Stomach flu
- Winter vomiting disease
- Cruise ship virus

# Norovirus

- 90% of world wide non bacterial gastroenteritis.
- 50% of all food-borne outbreaks of gastroenteritis in the US.

# Incubation Period

- Infection can occur with 10-18 viral particles
- One to two days
- Multiplies in small intestine
- First presentation sudden emesis
  - Can be diarrhea followed by emesis

# Case Definition

- Acute onset; Duration 24-60 hours
- Nausea/emesis & loose stool
- Abdominal pain
- Also:
  - Lethargy, Malaise
  - Myalgia, Headache
  - Low grade fever

# Prone to Fluid Loss

- Intra vascular fluid depletion
- Intra cellular fluid depletion (dehydration)
- Dangerous in elderly:
  - Reduce diuretics
  - Monitor vital signs
  - Check fluid/renal/electrolyte status (BMP)

# Transmission

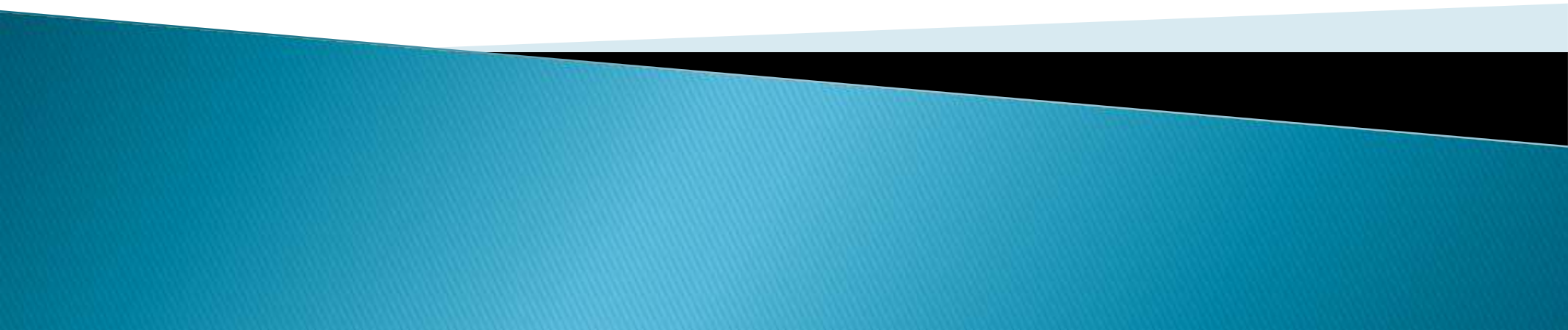
- Person to person
- Fecally contaminated food or fluids.
- Emesis contains higher titers of norovirus than liquid stool.
- Emesis aerosolizes virus.

Glass et al NEJM  
361:18 October 29,  
2009

# Diagnosis

- Polymerase Chain Reaction (PCR) Assay
- Very sensitive (can detect 10 viral particles)
- Results can be obtained in several hours.
- ELISA less sensitive / specific.

# Frequent Settings (closed communities)

- Day care
  - Dormitories
  - Hospitals
  - LTC facilities
  - Cruise ships
- 

# Immunity After Infection

- Incomplete
- Temporary
- Inherited predisposition

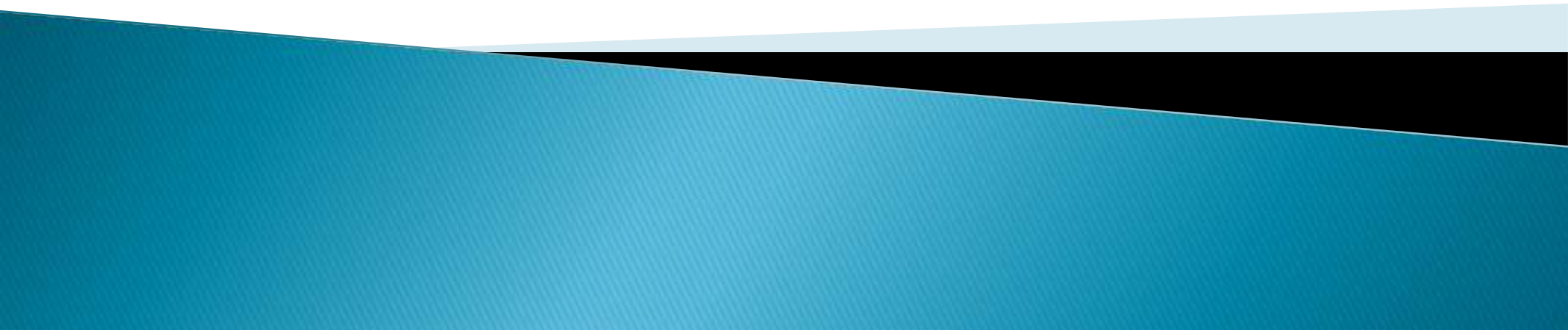
# Virus susceptibility

- Single Strand RNA Virus without an envelope:
  - Rapidly killed by chlorine-based disinfectants
  - Less susceptible:
    - Alcohols
    - Detergents

# Infection Control

- Hand washing with soap and water is effective
- Prompt cleaning of emesis/loose stool
- 10% Chlorine Solution

# Reporting of an Outbreak

- **Three cases** with similar presentation
  - All three cases occur within **one week**
  - All three cases in **close proximity** (same hallway, etc.)
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# Notifications

- Department of Health (State, County)
- Residents/families
- Medical Director & Physicians
- Ombudsman
- Other facilities utilized by residents (eg: dialysis center)

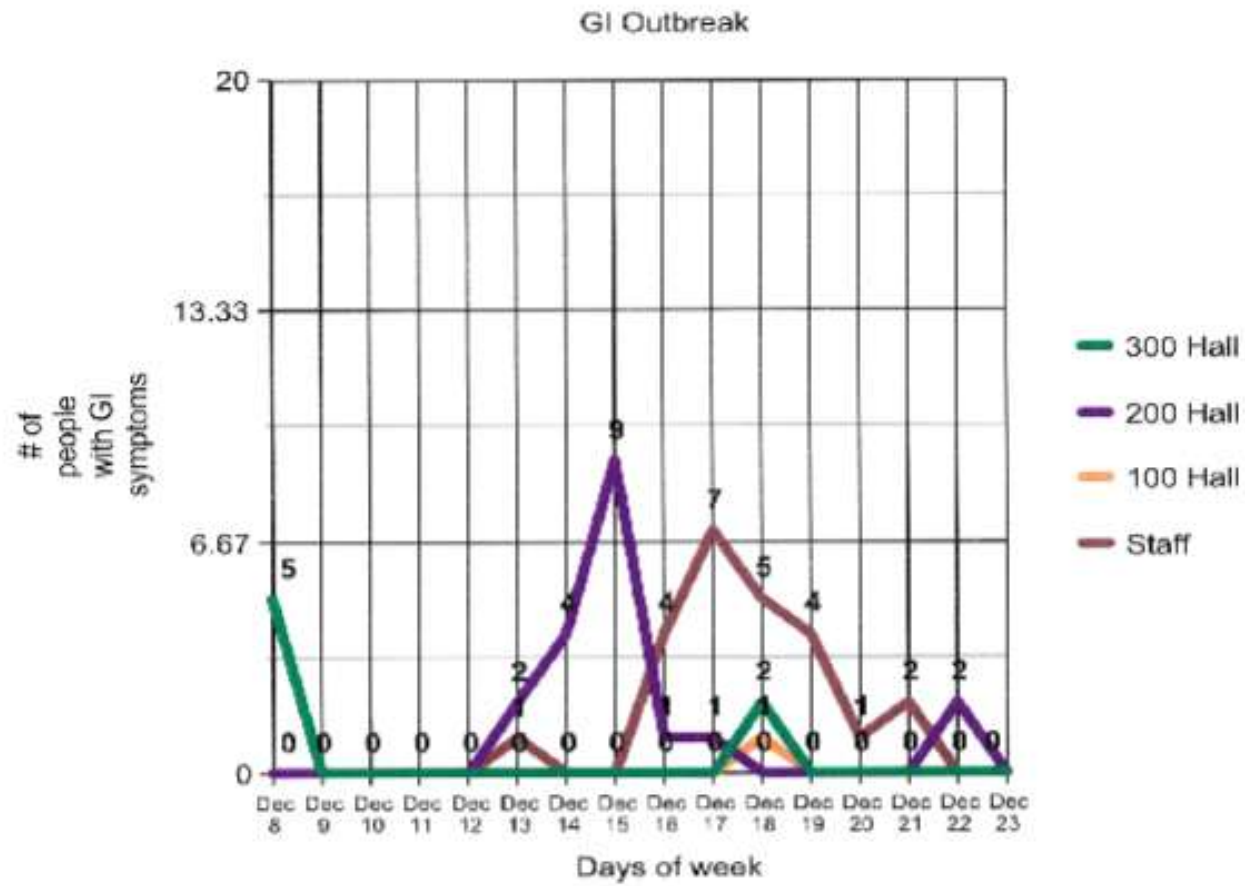
# Norovirus Outbreak

- Log book:
  - All communications
  - All in services
  - All new cases (date of onset)
  - Infection control measures

# Graph New Cases

- X-axis: days
- Y-axis: new cases that day
- Multiple curves:
  - Residents of each hall
  - Staff

# Outbreak Graph



# Norovirus Outbreak

- **Sequester** symptomatic residents (during symptoms and for two days afterwards):
  - Paper plates, plastic utensils
  - Red Bag protocol
- **Cohort** staff

# Norovirus Outbreak

- Identify and send home staff that is symptomatic:
  - Food handlers
  - Nurses
  - Certified NAs
  - Others
- Home for 72 hours (longer if sx)

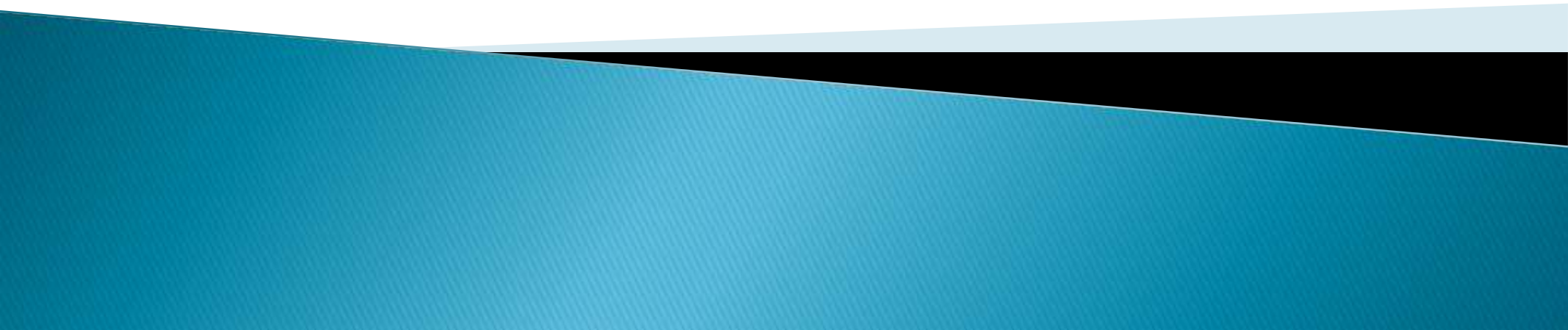
# Norovirus Outbreak

- Signage:
  - Front door
  - Bathrooms
  - Nursing stations

# Norovirus Outbreak

- Clean bathrooms (and soiled surfaces):
  - Visitor bathrooms 2x per day.
  - Infected Resident bathrooms >2x per day.
  - Non Infected Resident bathrooms 1x per day.

# What to Clean in a Bathroom

- Entire toilet seat (top and bottom)
  - Entire toilet (including flush handle)
  - Sink (including faucets)
  - Soap dispenser (including soap push)
  - Grab bars
  - Floor
  - Door handle
- 

# Norovirus Outbreak

- Hopper:
  - Shield and Gloves
  - Or, Mask, Apron, & Gloves
  - Clean hopper and area >2x per day

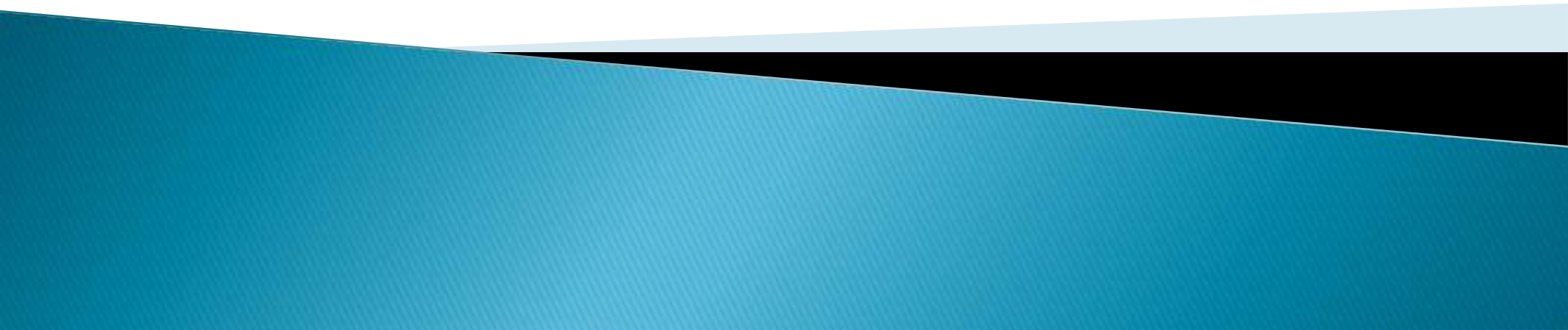
# In Service

- Hand washing
- Infection control strategy
- Norovirus epidemiology and clinical picture
- How to clean emesis, loose stool
- Report new cases (residents, staff)

# Identifying Index Case

- Visitor (child)
  - Employee (food handler, nursing staff)
  - Recently admitted resident
- 

# When to Admit New Residents

- 48 hours after last resident's symptoms have resolved.
  - Floor/area specific.
  - Full disclosure to Resident & Family.
- 

# Outbreak Findings

## Colorado Facility with Norovirus

- Medication spoon contamination
- Dishwasher temperature below standard
- Rehab Gym toilet not cleaned
- Sick Food handler
- Non virucidal cleaning solution
- Locked cleaning cabinet at night
- Scoop left in ice (or not cleaned daily)

# Case 2

- ▶ During review of the residents on your skilled unit you are made aware of 3 of 20 residents with c.difficile. 2 other residents have a new onset of diarrhea.
- ▶ 3 of the residents were admitted with diarrhea and were diagnosed with c.diff shortly after admission. Of the 2 new cases one had been on an antibiotic in the past 10 days and the other was a roommate of a resident admitted with diarrhea.

# Infection Control Surveillance Program

- Infections present on the resident's admission or readmission, or that develop within 72 hours after admission, are NOT considered Health Care associated infection (HAI)
  - Aka nosocomial
  - New guidance in 2009 previously 48 hours

# Clostridium Difficile

- ▶ 2010 – Clinical Practice Guidelines for *Clostridium Difficile* Infection in Adults
  - 2010 Update by the Society for Healthcare Epidemiology in America and Infectious Disease society of America
  - *Infection Control and Hospital Epidemiology May 2010, Vol 31(5) pp 431-455*

# Clostridium difficile

- ▶ Diagnostic Criteria
  - Diarrhea
  - Evidence of CDAD by any of the following
    - Positive assay
    - Pseudomembranous colitis
    - Positive stool culture

# Clostridium difficile

## Diagnostic Tests

- ▶ Cell Culture Cytotoxin Assay
  - Combined with stool culture is “gold standard”
  - Long turnaround time
- ▶ Stool Culture
  - Sensitive but not specific
- ▶ EIA
  - Rapid but less sensitive than cytotoxic assay
- ▶ PCR testing

# Clostridium difficile

## Facts

- ▶ Leading cause of nosocomial enteric infection.
- ▶ 3 million new cases/year in U.S.
- ▶ 20 thousand new cases/year in U.S. outside hospital setting.
- ▶ 2003 nearly 2% of patients transferred from acute care to LTC had dx

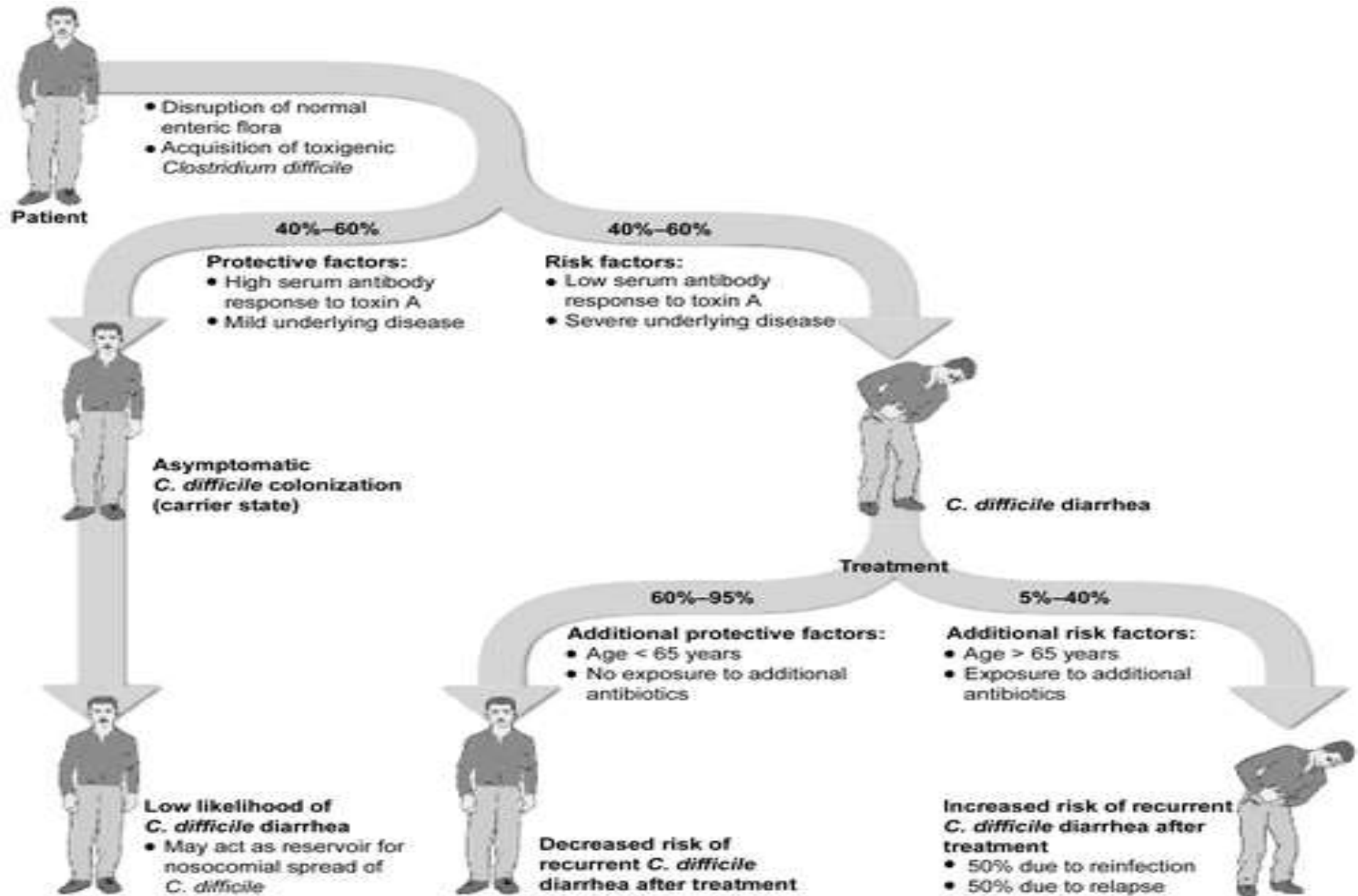
# *C. difficile*-associated Diarrhea Risk Factors in LTC

- ▶ Low albumin
- ▶ Age
- ▶ Antibiotics
- ▶ Proton pump inhibitors
- ▶ More recent admission to the facility

# Clostridium difficile

- ▶ Anaerobic spore-forming gram positive rod
  - Produces toxins A & B, plus others
- ▶ Clostridium difficile infection (CDI)
  - Diarrhea, Fever, Leukocytosis
  - Pseudomembranous colitis
  - Toxic megacolon, sepsis, death
- ▶ Fecal-Oral transmission
  - Contaminated environment
  - Hands of Healthcare workers

# CDI risk factors and pathogenesis



# Emergence of Epidemic C difficile clone: NAP1 /BI/027 strain

CDI rates in the US have tripled between 2000–2005

Severity of infections and mortality have also been much higher than historic CDI

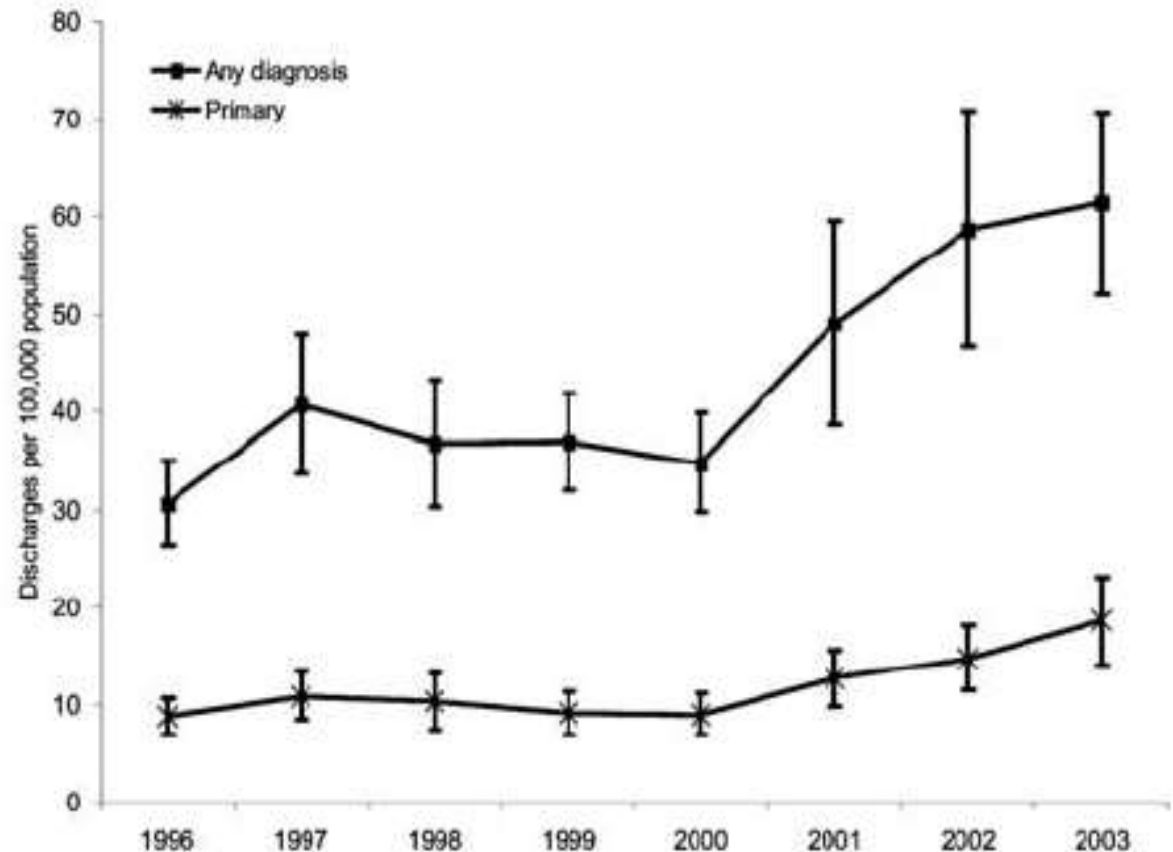
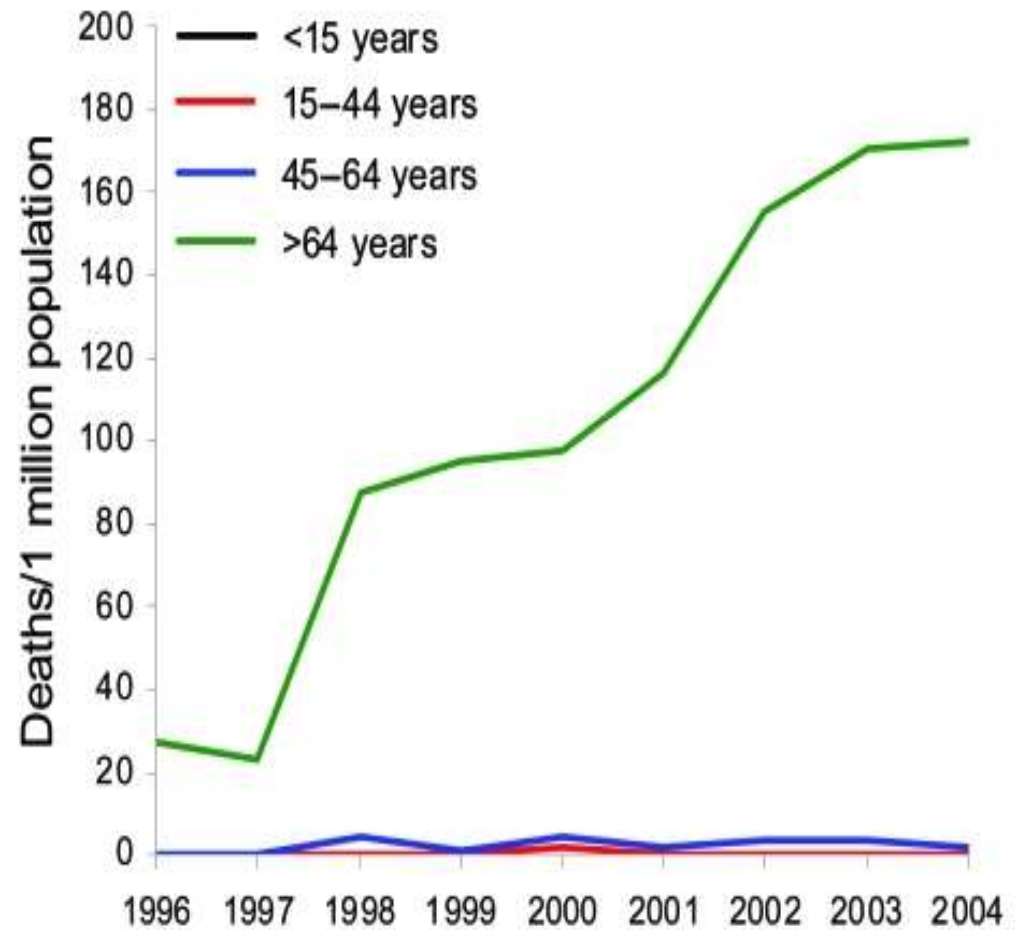
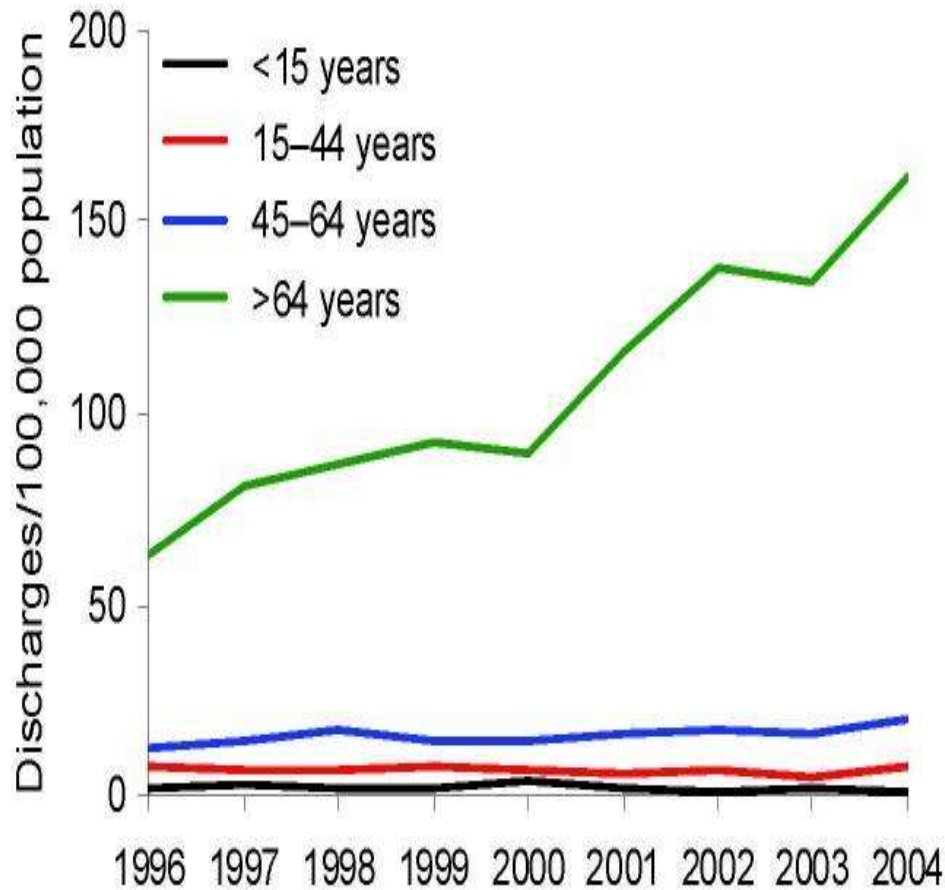


Figure 1. National estimates of US short-stay hospital discharges with *Clostridium difficile* listed as primary or as any diagnosis. Isobars represent 95% confidence intervals.

# Disproportionate impact of epidemic CDI in the elderly



Diagnosis, Management, and Prevention of *Clostridium difficile* Infection in Long-Term Care Facilities: A Review

*Andrew E. Simor, MD*

- More than half of healthcare associated CDI cases manifested in long-term care facilities
- A significant number of individuals admitted to LTC are colonized with *C difficile*, and up to 20% acquire it while residing in this setting
- CDI is the most commonly identified cause of acute diarrheal illness in the LTC population

# Exposures and risk factors related to CDI

- ▶ Fluoroquinolones have been particularly implicated in the risk of epidemic CDI due to higher resistance in this strain vs. historic *C. diff* isolates

Table 1. Factors that May Contribute to Greater Risk of *Clostridium difficile* Infection in Older Adults

• Frequent receipt of antimicrobial agents
• Frequent or prolonged hospitalizations
• Presence of underlying comorbid medical conditions
• Use of feeding tubes (nasogastric, gastrostomy)
• Use of acid suppressant medications
• Age-related effects on host defense mechanisms
Decreased gastric acidity
Diminished antibody response to <i>C. difficile</i> toxins
Impaired <i>C. difficile</i> -specific neutrophil phagocytosis

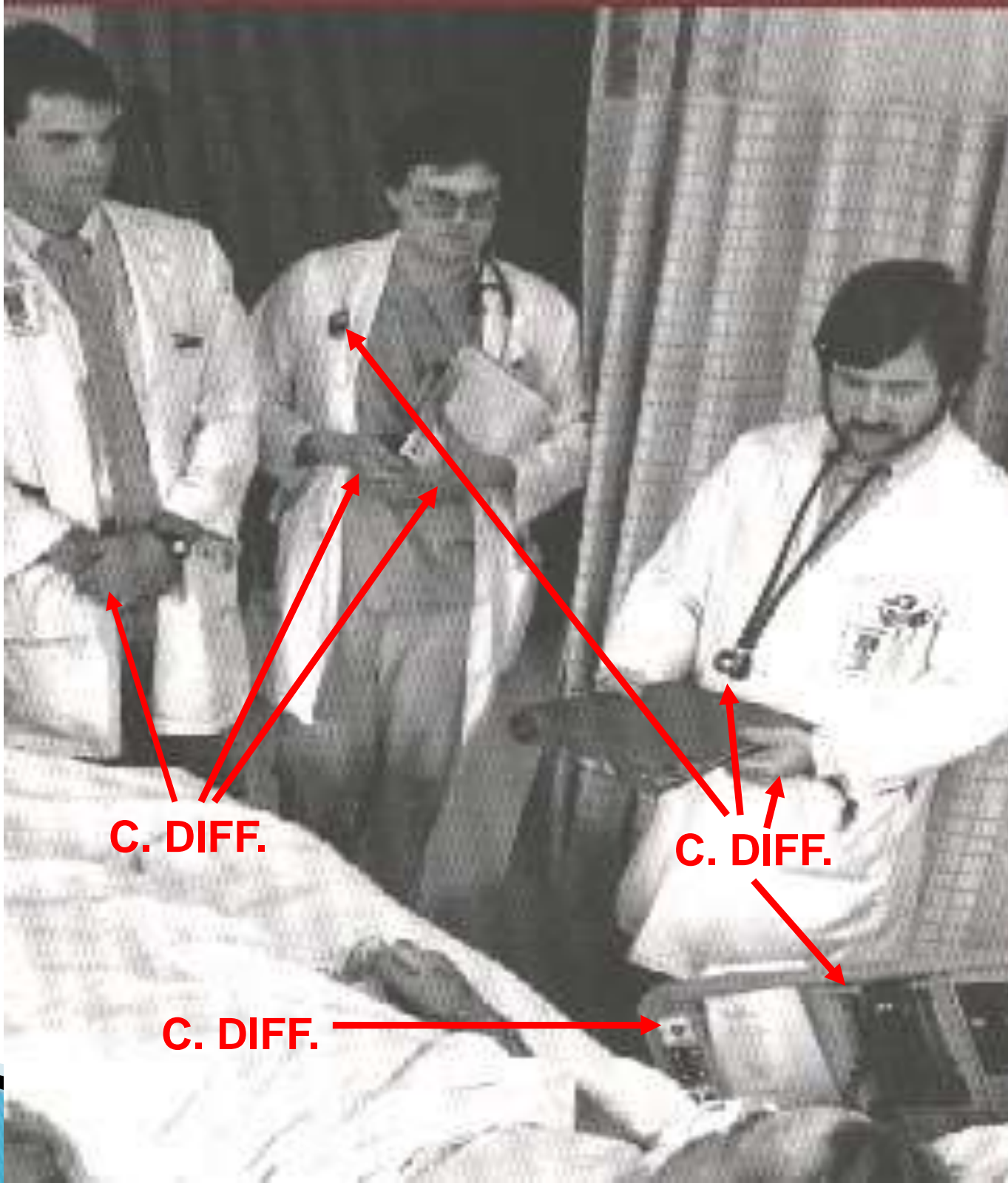
# CDI management strategies

- ▶ Use of oral vancomycin based on severity of infection
- ▶ Management of
  - Two or more of the following: Age >60; Tm >38.3; WBC >15,000; Serum albumin <2.5

Table 3. Treatment of *Clostridium difficile* Infection

Indication	Treatment
Mild <i>C. difficile</i> infection*	Discontinue inciting antibiotic(s), if feasible; metronidazole 250 mg orally every 6 hours for 10–14 days
Severe <i>C. difficile</i> infection <sup>†</sup>	Discontinue inciting antibiotic(s), if feasible; vancomycin 125 mg orally every 6 hours for 10–14 days
Fulminant <i>C. difficile</i> infection with ileus or toxic megacolon	Metronidazole 500 mg intravenously every 6 hours for 10–14 days and consider vancomycin 500 mg enterally or by enema every 6 hours and surgical consultation
First recurrence of symptomatic infection	Metronidazole or vancomycin as for initial episode (and depending on disease severity)
Subsequent recurrence of symptomatic infection	Vancomycin (prolonged, pulse-dosed, and tapering course) <sup>‡</sup>

\*Not meeting criteria for severe infection.



**C. DIFF.**

**C. DIFF.**

**C. DIFF.**

# Clostridium difficile

## PRIMARY PREVENTION

- ▶ Hand washing and gloves.
  - Both proven to lower *Clostridium difficile* rates.
    - Simple tasks but compliance low.
      - Increasing pace of patient care

# Clostridium difficile

## PRIMARY PREVENTION

- ▶ What to wash with?
- ▶ Study – liquid soap vs 4% chlorhexidine
  - Without gloves – no difference.
  - With gloves – liquid soap out-performed 4% chlorhexidine.
- ▶ Wash with soap

# Clostridium difficile

Room contamination rates (McFarland, 1989).

- C. diff. (-) patient = 8%
- C. diff. Asymptomatic carrier = 29%
- CDAD patient = 49%

# Clostridium difficile

## PRIMARY PREVENTION

- ▶ Antibiotic Control
  - Avoid antibiotic use.
  - Limit duration.

# Clostridium difficile


## SECONDARY PREVENTION

- ▶ Hand washing/gloves.
  - Instruct visitors to hand wash with soap and water
- ▶ Thorough cleaning of all contaminated and potentially contaminated surfaces.
  - 1:10 bleach solution

# Clostridium difficile

- ▶ Private room with contact precautions
  - If single room not available cohort providing commode for each resident
- ▶ Maintain contact precautions for duration of diarrhea
- ▶ Routine identification of asymptomatic carriers is not recommended
  - Treatment of these asymptomatic residents is not recommended

# Medical Director Role

- ▶ Identification of Outbreaks
  - ▶ Review of infection control monthly
  - ▶ Policies and procedures (assist with development or review existing)
  - ▶ Antibiotic stewardship in the facility
  - ▶ Staff education
- 

Thank You

