

The Role of Infection Control in *Clostridium difficile* Outbreaks: There Is So Much We Don't Know

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3rd International *Clostridium difficile* Symposium, Bled, Slovenia

First – the good news.....

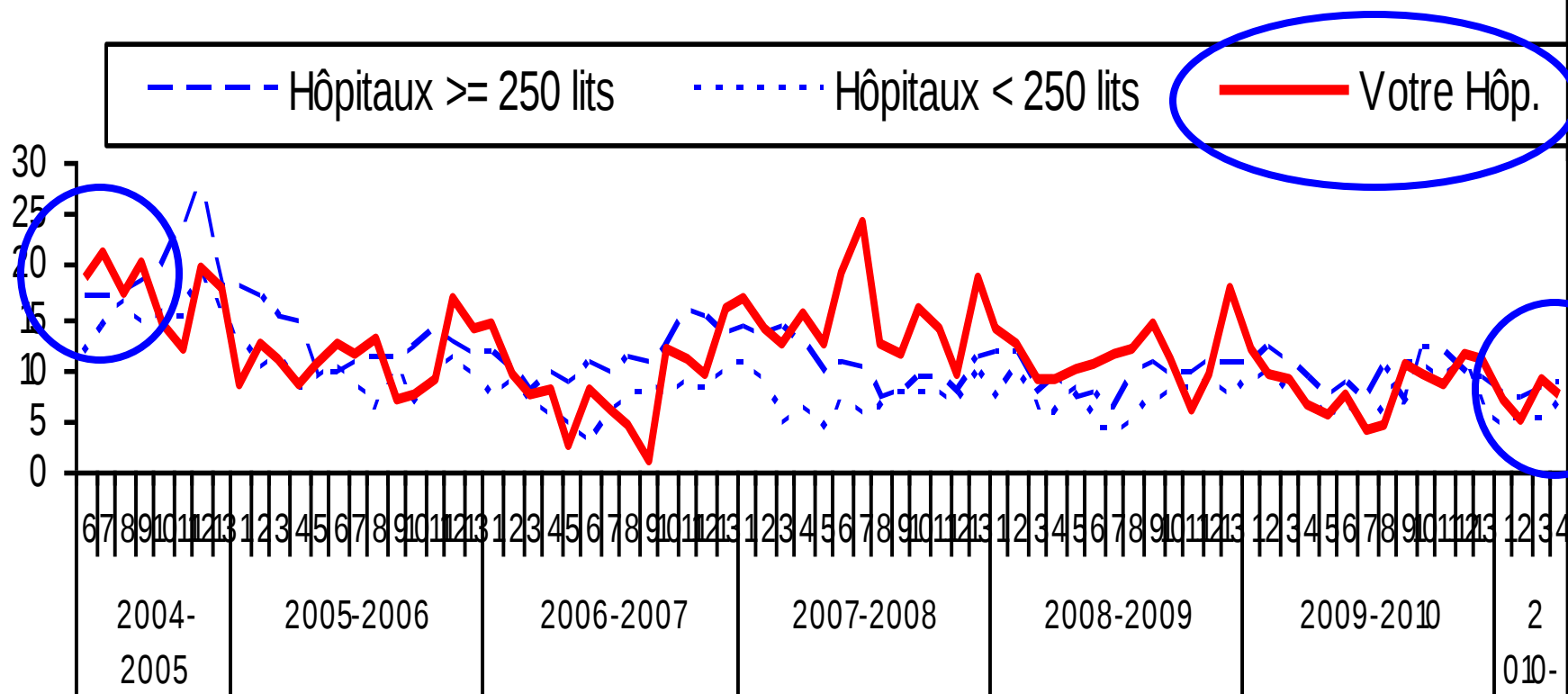


➤ Despite the fact that CD spores are resistant to decontamination, that antibiotics are widely used in most healthcare settings, and our inpatient population is getting older and sicker, CDI outbreaks are controllable

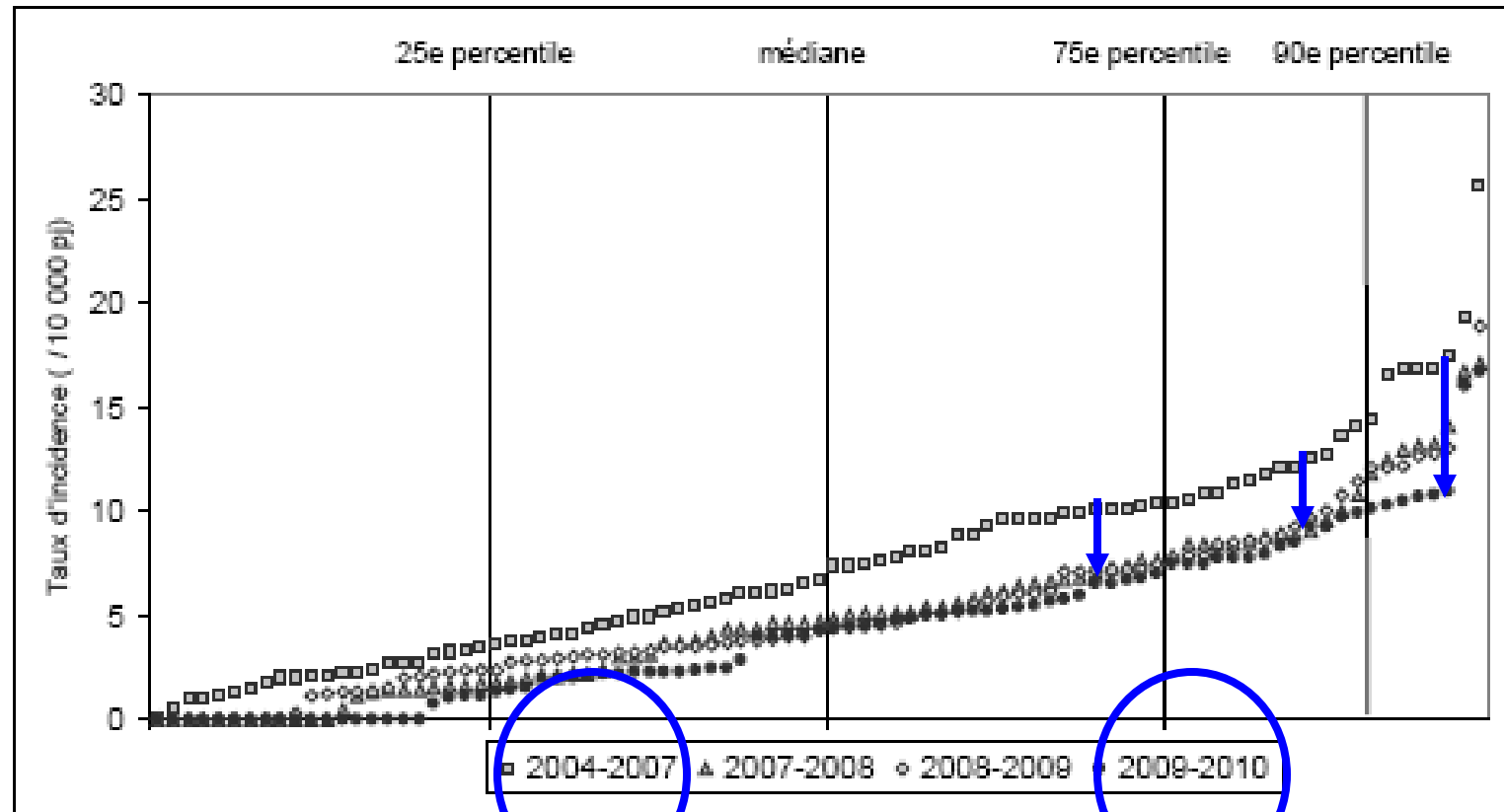
- On a **local** level
- On a **regional** level
- On a **national** level

One hospital

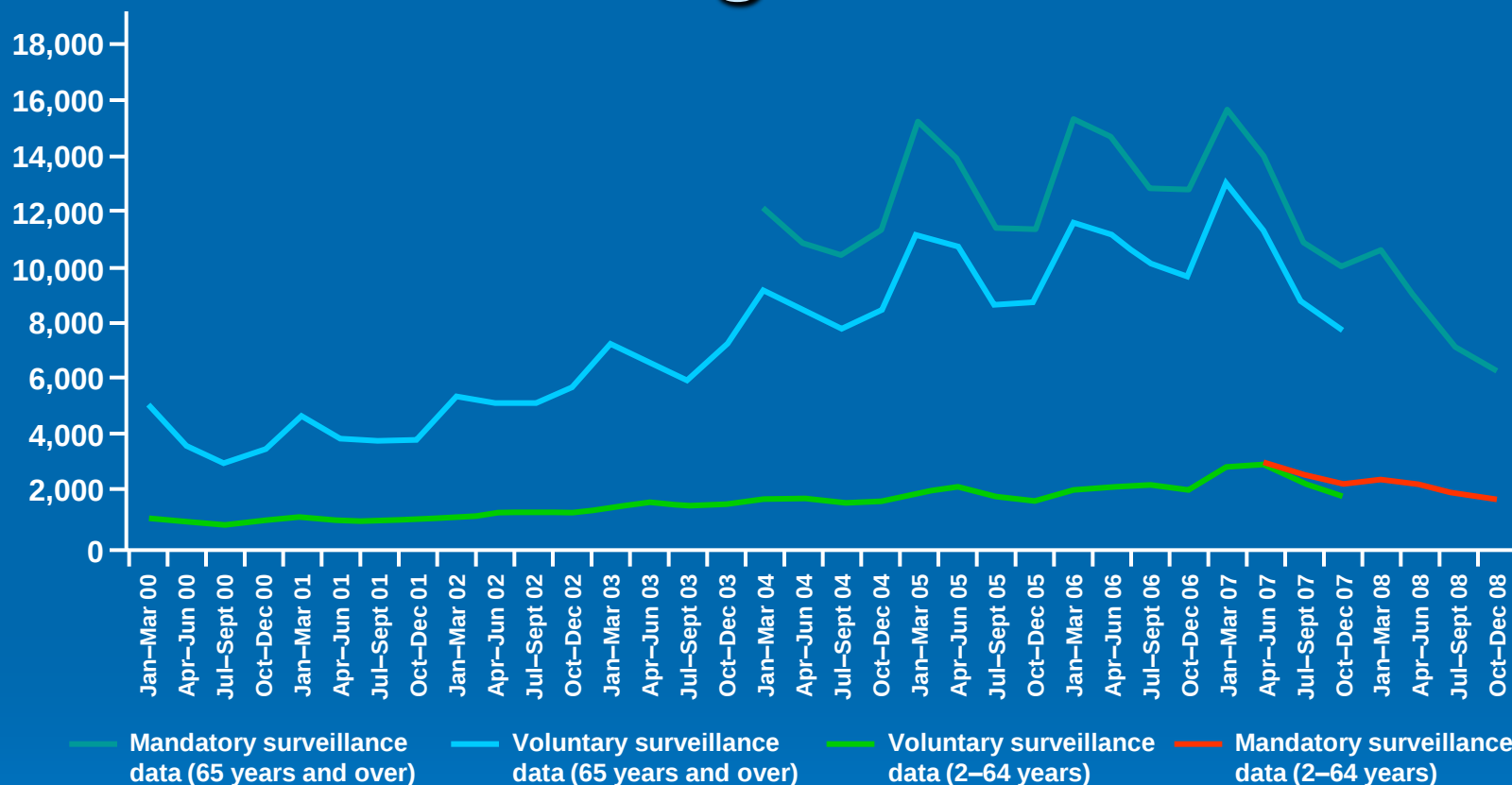
Taux pour les hôpitaux de Montréal, par taille, période 6 (2004-5) à 4 (2010-2011)*



Entire province of Quebec



England



National Audit Office. *Reducing Healthcare Associated Infections in Hospitals in England*. London, England: National Audit Office; 2009. Copyright © National Audit Office. Table data from the Health Protection Agency.

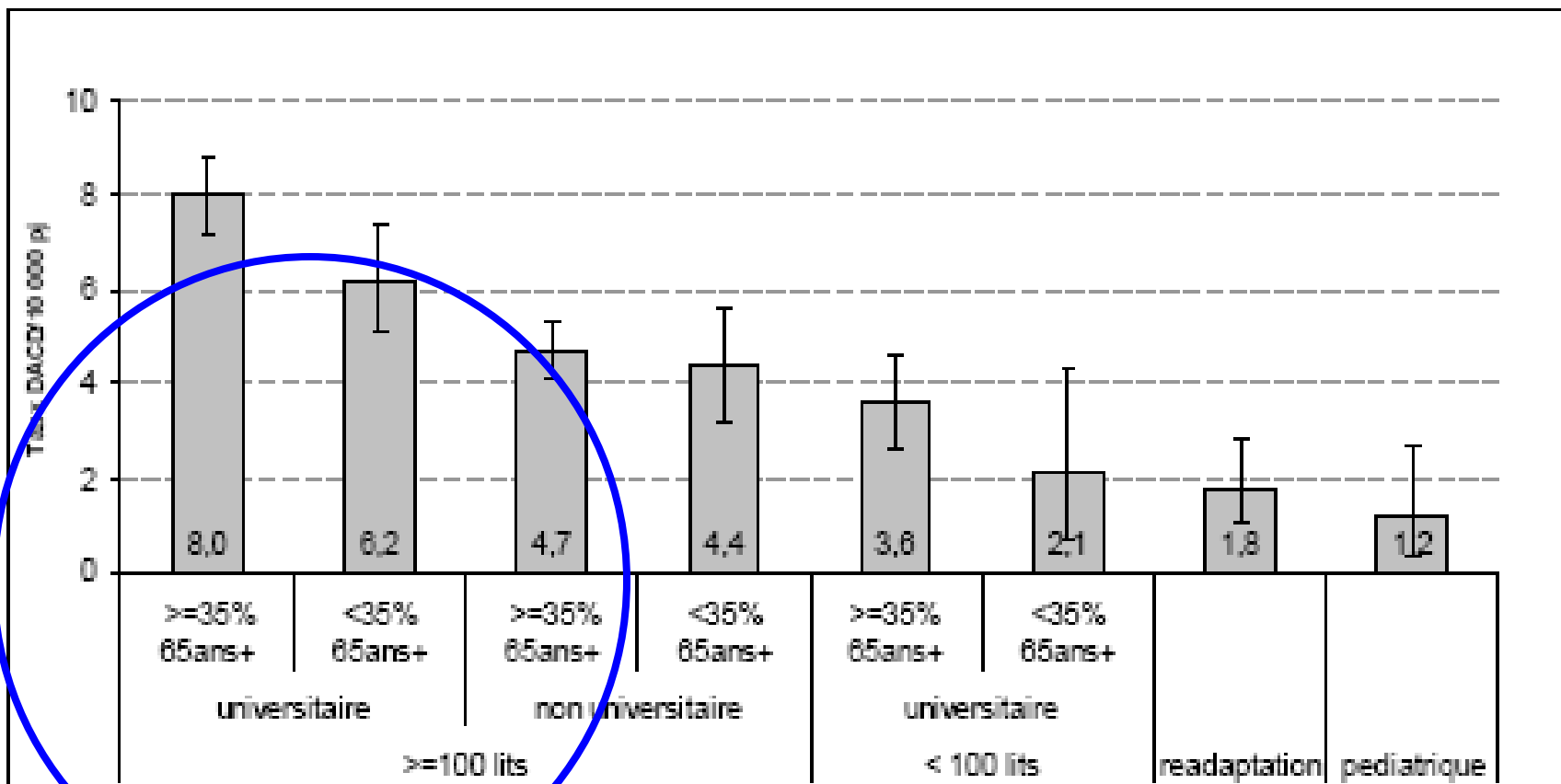
The Infection Prevention & Control (IPC) approach to CDI

- Can't change the patient (age, requirement for surgery, requirement for antibiotics, etc.) and some facilities are also “stuck” with hyper-virulent clones
- Therefore, concentrate on reducing patient acquisition of *C. difficile*
 - i.e. “back to basics” Infection Prevention & Control

The “basics”

- More IPC nurses per facility
 - Teaching, reinforcement of precautions, protocol development, surveillance
- More infection control support (secretaries, budgets)
- Purchase of small equipment & commodes for patient rooms (to discourage sharing and cross-contamination)
- Adequate housekeeping personnel & supplies
- Building of additional sinks, bathrooms, and more private rooms
- Antibiotic formulary review and control
- Government-funded CDI surveillance: *where are we? do we have a problem? where do we want to go?*
- Standardized protocols for all aspects of CDI

Surveillance as a tool



Guidelines as a tool



Clostridium difficile infection: How to deal with the problem

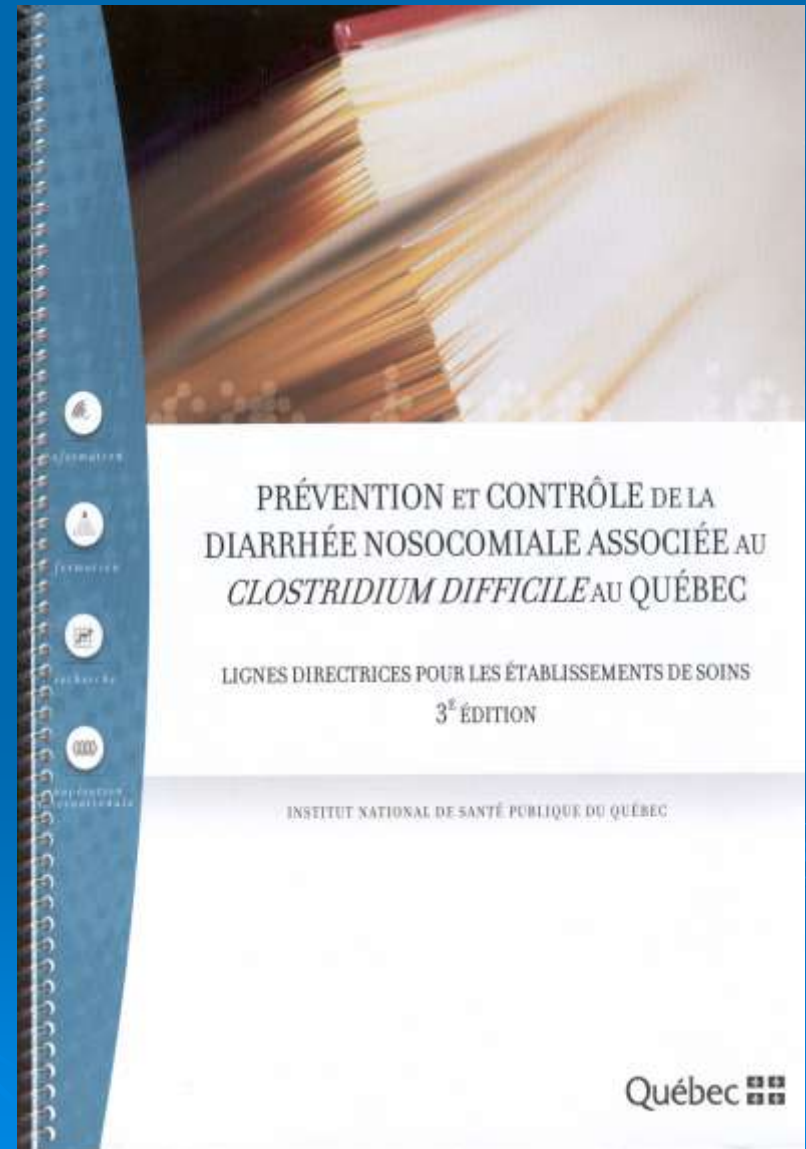
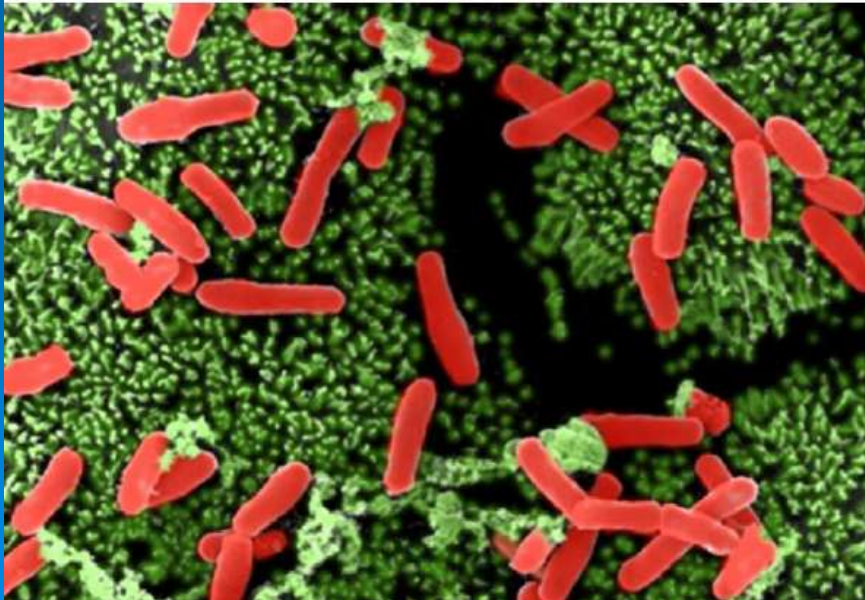


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Clinical
&
Lab diagnosis

Isolation rooms

Hand hygiene

Personal protective equipment

Environmental disinfection

“Dedicated” patient equipment

Appropriate antibiotic
prescribing

Surveillance

etc, etc

Simple is best

S	Suspect that a case may be infective where there is no clear alternative cause for diarrhoea
I	Isolate the patient and consult with the infection control team (ICT) while determining the cause of the diarrhoea
G	Gloves and aprons must be used for all contacts with the patient and their environment
H	Hand washing with soap and water should be carried out before and after each contact with the patient and the patient's environment
T	Test the stool for toxin, by sending a specimen immediately

From the HPA document:

Clostridium difficile infection: how to deal with the problem.

Now – the bad news.....





The image shows two large stacks of concrete barriers. Each barrier is composed of a light-colored concrete outer shell and a dark, textured gravel core. The barriers are stacked in a way that shows their interlocking design, with metal pins visible between the units. They are resting on a gravel surface. The background is a clear sky and some distant trees.

The Barriers to Control

The barriers to control

- The **same issues**, whether Canadian or American or European hospitals, new or old buildings, large or small facilities.....

Barriers.....

- How do we isolate patients when we have a limited number of single rooms?

Many healthcare facilities still have 2-, 3- and 4-bedded (or more) rooms



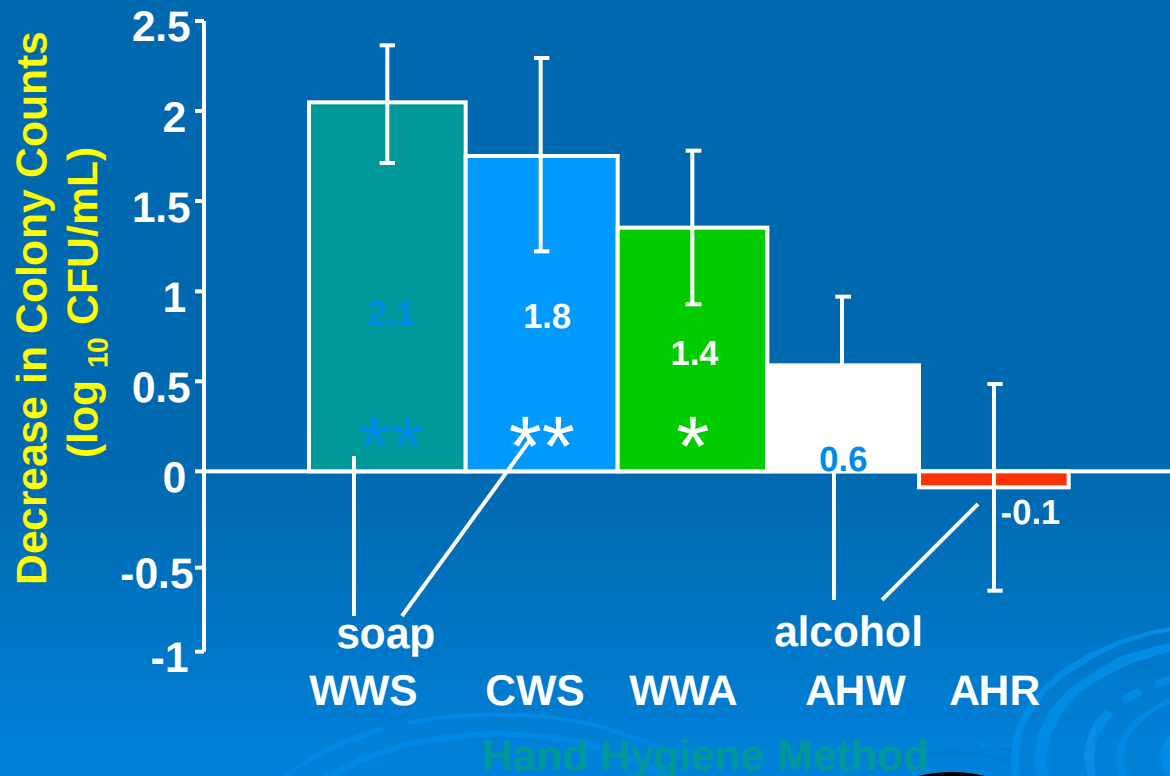
More barriers.....

- How do we increase **handwashing** compliance, when we know that alcohol hand-rinse is inferior to soap-and-water for CDI transmission?



Efficacy of Hand Hygiene in Removing *C. difficile*

Decrease in colony counts compared with no wash



AHR, alcohol hand rub; AHW, alcohol hand wipe; CWS, cold water and soap; WWA, warm water and antibacterial; WWS, warm water and soap

Oughton M et al. *Infect Control Hosp Epidemiol.* 2009;30:939.

More barriers.....

- Many hospital rooms have only one sink – in the patient's bathroom!
- That means HCWs use the sink contaminated by a CDI patient.

More barriers.....

- It is well-accepted that environmental CD spores in the healthcare facility are the source of infection for healthcare-associated CDI
- So how do we perform housekeeping to ensure that the environment is minimized as source of CD?

An illogical approach?

Focusing on the CDI patient:

Environmental cleaning of rooms or bed spaces of *C. difficile* patients should be carried out at least daily using chlorine-containing cleaning agents (at least 1,000 ppm available chlorine). (Code: Duties 4, 10I; Annex 2) **B**

All commodes, toilets and bathroom areas of CDI patients should be cleaned after each use with chlorine-containing cleaning agents (at least 1,000 ppm available chlorine). (Code: Duty 10I; Annex 2) **B**

From the HPA document:

Clostridium difficile infection: how to deal with the problem.



Mrs. T in room 412 has CDI; she is isolated in a private room

- her room is cleaned with bleach once daily

Mr. B in room 411 has diarrhea but no diagnosis yet of CDI; he has a room-mate in his 2-bedded room

- how is his room cleaned?

Mr. C in room 418 has no diarrhea at all; he also has a room-mate

- his room is cleaned with a non-bleach product

- at 22:00 he develops diarrhea (later proved to be CDI)

Mrs. K had CDI 3 weeks ago and is now in room 420 with no diarrhea

- she is started on antibiotics today for a UTI

- her room is cleaned with a non-bleach product

Housekeeping “nonsense” for CDI

- Assumes that all patients' CDI status remains constant over time
- Assumes that only symptomatic CDI patients are a source of CD spores
- Ignores the fact that there are more asymptomatic CD-colonized patients in a healthcare facility than CDI patients
- Pretends that we can pick and choose which rooms should be bleached in order to decrease the overall CD spore burden and risk

“Universal” approach?

- If bleach wasn't so toxic to patients, personnel, and the environmental surfaces, it would be used for ALL patients' rooms
- Need to find a tolerable “universal” disinfectant against CD spores which can be used on ALL patient rooms ALL of the time.



More barriers.....

- **Who** will clean the personal-hygiene and medical equipment after use and between patients?



Cleaning

CAUTION

- Do not rub hard over the lettering.
 - Do not use solvents or detergents for cleaning.
 - Do not use organic solvents such as thinner, benzine, or industrial alcohol. These damage the cardiograph, patient cable and electrodes.
 - Before cleaning, turn the power off and disconnect the AC power cord from the cardiograph.
 - The "CAUTION LABEL" contains important information for operating the cardiograph. Clean the label if it is dirty. If the label is damaged or difficult to read, contact your NK distributor or representative to replace it with a new one.
-
-

Cleaning the Cardiograph

Before or after use:

To remove dirt, clean the exterior surface of the cardiograph with a soft cloth.

If the patient cable connector is dirty, clean it with a soft cloth.

Now – the worst news.....



What we don't know about controlling CDI

- Which strategies are most important in controlling CDI outbreaks?
- IMPOSSIBLE TO TELL SINCE MOST FACILITIES IMPLEMENT A BUNDLED APPROACH WITH ***ALL STRATEGIES AT THE SAME TIME***

What we don't know about controlling CDI

- How long should we isolate patients with CDI?
- WE HAVE NO IDEA WHAT THE OPTIMAL DURATION IS. MOST FACILITIES ISOLATE PATIENTS FOR 48-72 HOURS AFTER CESSATION OF DIARRRHEA. ***DOES THIS REALLY MAKE SENSE???*** SINCE 20-50% OF PATIENTS RECUR POST-THERAPY, WHY NOT THEIR ENTIRE HOSPITALIZATION?

What we don't know about controlling CDI

- How important are asymptomatic CD-colonized individuals in healthcare facilities?
- **LIKELY VERY IMPORTANT. V.A. STUDY SHOWED 11% OF ASYMPTOMATIC PATIENTS CD-CULTURE-(+). (CORRELATED WITH RECENT ANTIBIOTICS AND INCREASED LENGTH OF STAY)*. PITTSBURGH STUDY SHOWED ASSOCIATION OF CD STRAINS FROM CDI CASES AND ASYMPTOMATIC CARRIERS**.**
- **SHOULD WE BE SCREENING AND ISOLATING *ASYMPTOMATIC* COLONIZED INDIVIDUALS?**

* Guerrero D, et al. Abstract #K-1299. ICAAC 2010.

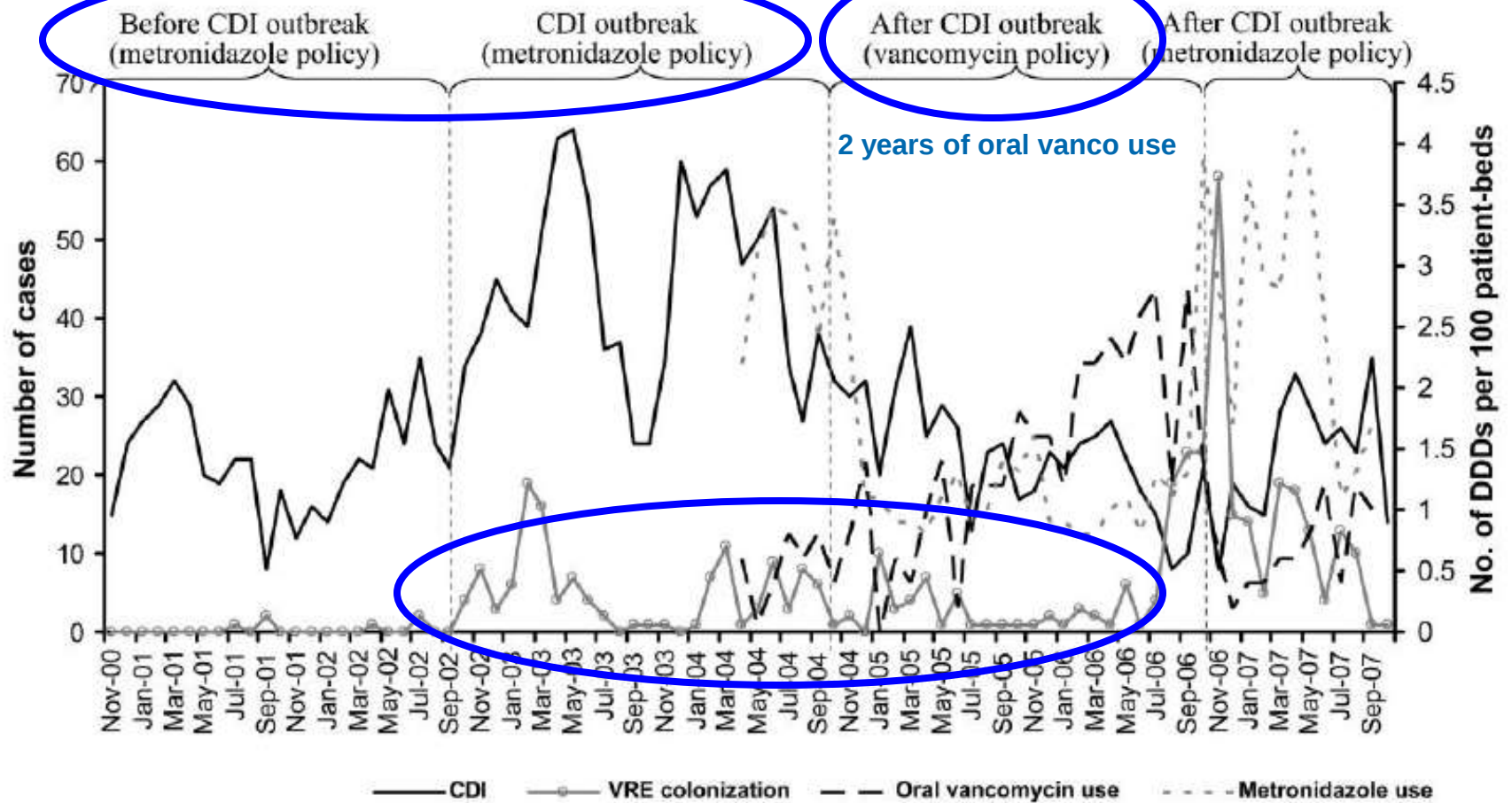
** Curry SR, et al. Abstract #K-1298. ICAAC 2010

What we don't know about controlling CDI

- How important is rapid treatment of “presumptive CDI” (i.e. healthcare-associated diarrhea) in controlling CDI outbreaks?
- **LIKELY VERY IMPORTANT, BUT ITS EXACT IMPACT IS UNKNOWN. PATIENTS WITH DIARRHEA IN MULTI-BED ROOMS ARE IMPORTANT SOURCE OF TRANSMISSION. BUT WHAT ABOUT PATIENTS IN SINGLE ROOMS?**

What we don't know about controlling CDI

- If vancomycin is preferable for mod-severe CDI patients, what is the impact of increasing use of vancomycin on VRE in healthcare facilities?
- NO EVIDENCE THAT INCREASED USE OF ORAL VANCOMYCIN FOR CDI ASSOCIATED WITH INCREASED VRE.
- SINGLE-STUDY EVIDENCE THAT IT IS NOT ASSOCIATED WITH VRE.



What we don't know about controlling CDI

- What is the optimal strategy for environmental cleaning and disinfection to control CDI?
- **USE OF BLEACH AS THE AGENT OF CHOICE. BUT.....**
 - WHICH PATIENTS? (CDI vs. ALL)
 - WHICH ROOM AREAS?
 - WHAT FREQUENCY?
 - WHAT TOOLS? (MICROFIBRE vs. OTHERS)

What we don't know about controlling CDI

- What infection control is necessary when CDI patients go home (to live with their elderly spouses and/or ill family members, who might be taking antibiotics)?
- WE TELL PATIENTS “NOT TO PANIC” BUT ARE THEIR HOUSEHOLD CONTACTS AT RISK IF THEY TAKE ANTIBIOTICS?

What we don't know about controlling CDI

- Which antibiotic(s) should be restricted or forbidden during a CDI outbreak? What other antibiotic maneuvers should be taken?
- RESTRICTION OF CLINDAMYCIN AND CEPHALOSPORINS (+/- FLUOROQUINOLONES) HAS BEEN SHOWN TO BE EFFECTIVE
- WHAT ABOUT MORE CREATIVE ANTIBIOTIC RESTRICTIONS?
 - RESTRICTION OF PERI-OPERATIVE ANTIBIOTICS IN LOW-RISK PROCEDURES FOR HIGH-RISK PATIENTS
 - REPLACEMENT OF INTRA-OPERATIVE ANTIBIOTICS FROM A "HIGH-RISK" CLASS (i.e. CEPHALOSPORINS) TO ANOTHER "LOW-RISK" CLASS (i.e. BETA-LACTAM/BETA-LACTAMASE-INHIBITOR) OR LOW-RISK COMBINATION (i.e. VANCOMICIN + GENTAMICIN)

The final message

- ❖ Healthcare-associated CDI is controllable
- ❖ Control of CDI takes hard work, application of rigorous protocols and guidelines, and adequate personnel and \$\$\$
- ❖ Many barriers still exist to the implementation of “basic” IPC maneuvers
- ❖ There are many more **UNANSWERED** issues than **RESOLVED** issues in the control of CDI
- ❖ If control of CDAD is **achievable** in an **epidemic** situation with a **hyper-virulent clone**, then it should be equally (more?) controllable in an endemic setting with less virulent strains

Thank you

