



UZ
LEUVEN



Outbreak of *Bacillus cereus* in a burn unit

Annette Schuermans
Katholieke Universiteit Leuven/
University Hospitals Leuven
October 14th 2010



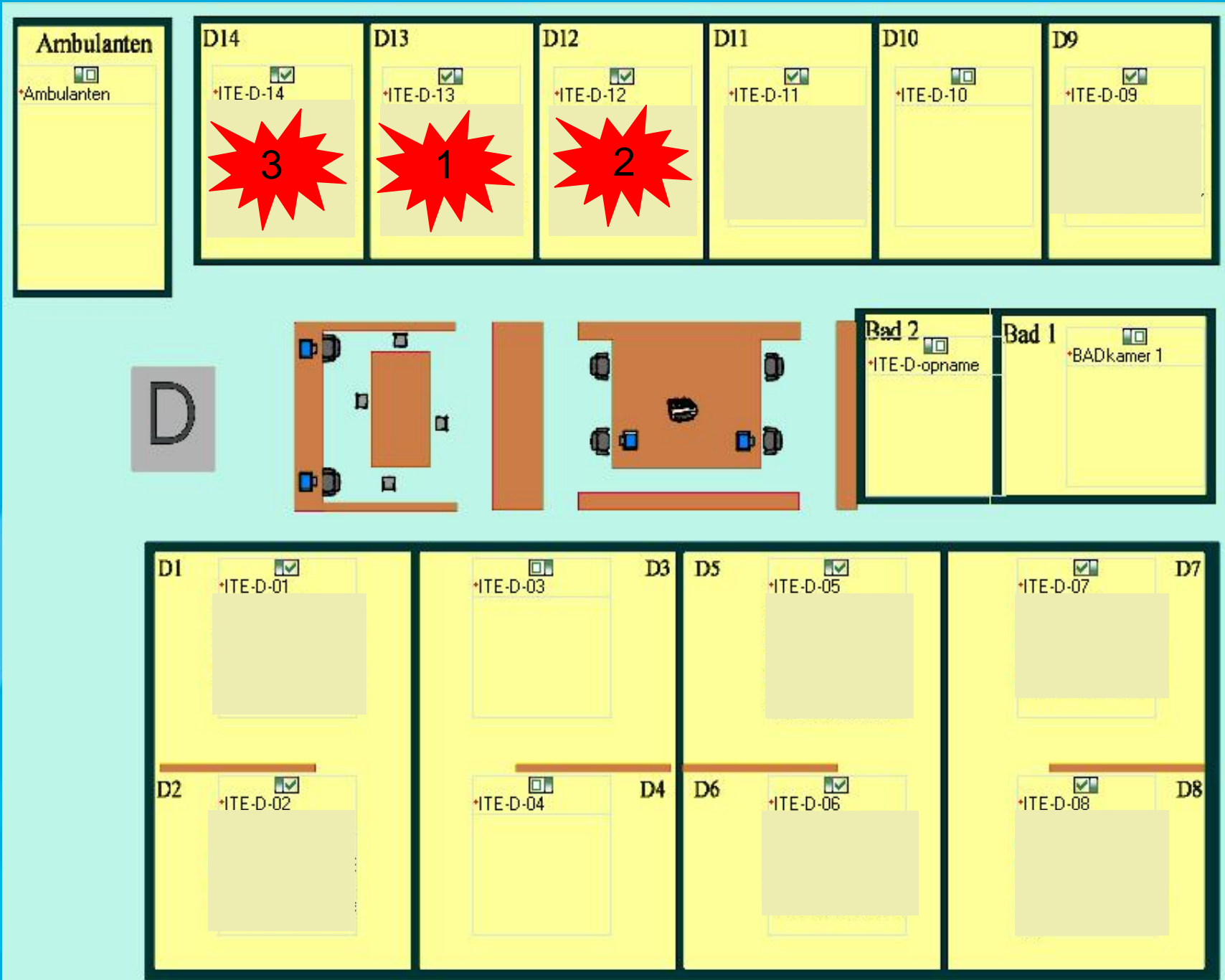
©UZ Leuven

UZ
Leuven

Herastraat 49
B - 3000 Leuven

www.uzleuven.be
tel. +32 16 33 22 11

UNIVERSITY HOSPITALS LEUVEN



1 ♂, 22, 22% TBSA due to a car accident

2 ♀, 84, 25% TBSA due to a house fire

3 ♂, 64, 50% TBSA due to a plane crash

Bacillus cereus



- Spore-forming aerobic Gram-positive motile rod
- The spores are resistant to alcohol
- Common environmental contaminant (soil, dust, fresh and marine water, ...) and mostly considered as a contaminant by the laboratory
- Common food-poisoning organism
- Local and systemic infections (endophthalmitis, bacteremia, meningitis, osteomyelitis...)

Search for the source

- Patient ?
- Health care worker ?
- Environment ?



Search for the mode of transmission

- Contact ?
- Droplet ?
- Airborne ?

Search for the source ⁽¹⁾

Index patient ?



Ribeiro et al; Burn wounds infected by contaminated water: case reports, review of the literature and recommendations for treatment. Burns 2009.

Control measures to stop person-to-person transmission

- Isolation interventions: single room, gloves, gown, (designated staff)
- Disinfection
 - daily of the environment with chlorine (1000 ppm)
 - twice a day of the high touch surfaces with chlorine solution (chloramine 0,5% in water)
 - of the wounds colonized with *B.cereus* with chloramine 0,5% in water
- Washing of the hands with water and soap instead of the use of alcohol rub.

Search for the source⁽²⁾



- Patient
- (Health care worker ?)
- Environment ?
 - Water
 - Air – surfaces
 - *Loeb et al. Can. J. Infect. Control, 1995*
 - Sheats
 - *Dohmae et al. J. Hosp. Infect, 2008.*
 - All liquids
 - Disinfectants, even alcohol-based
 - *(Hsueh et al. J. Clin. Microbiol, 1999)*
 - Soaps, shampoo, ointments
 - ...

Sampling of the environment

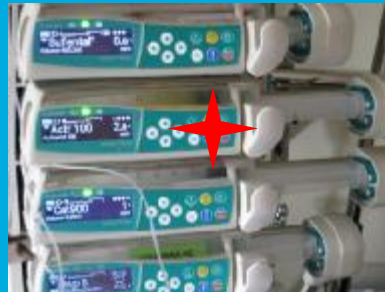
All negative, except ✦



✦ High touch surfaces highly contaminated

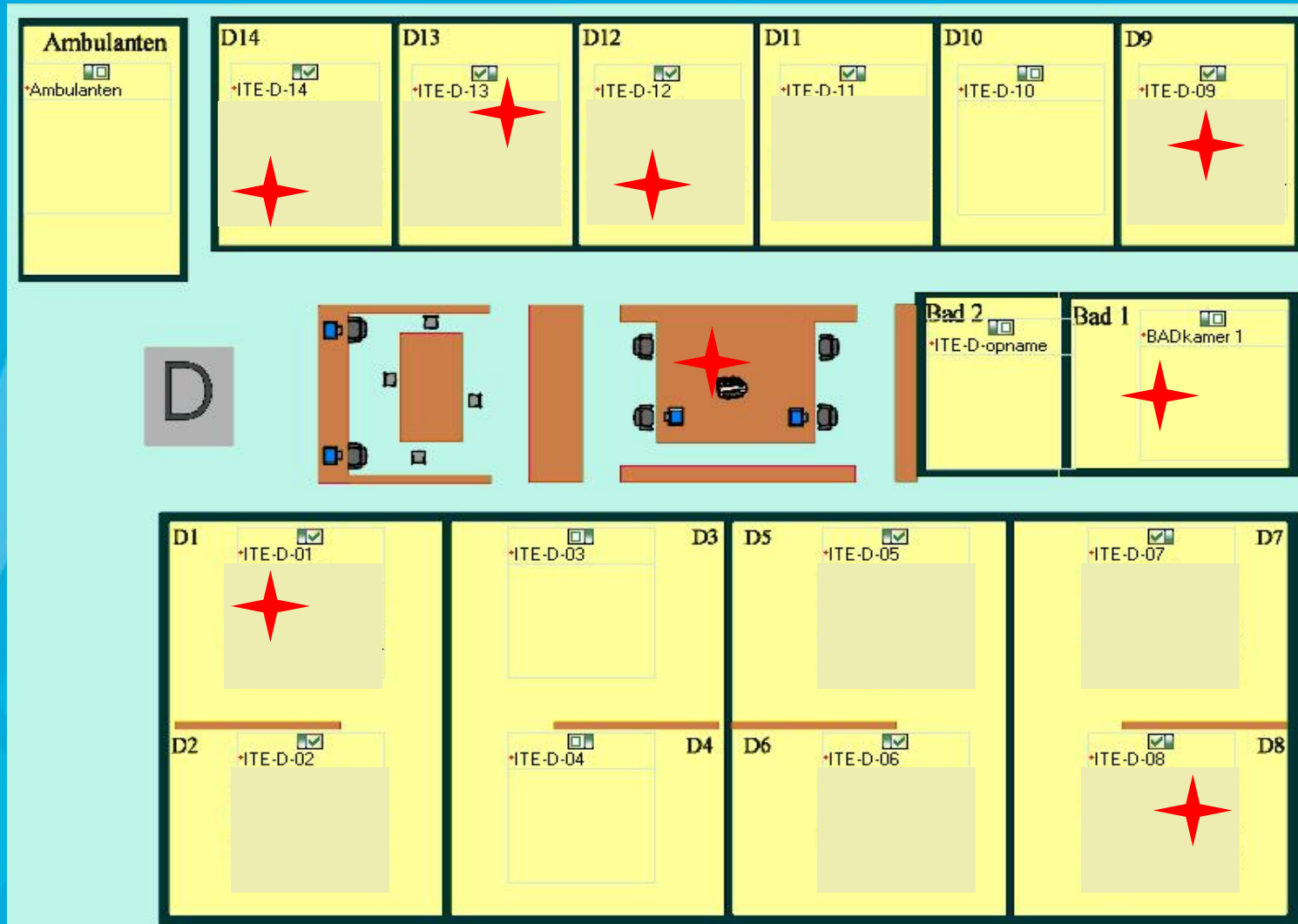
Follow-up ⁽¹⁾

- New environmental samples



⇒ persistence of B. cereus (high touch surfaces)
despite chlorine

Follow-up (2)

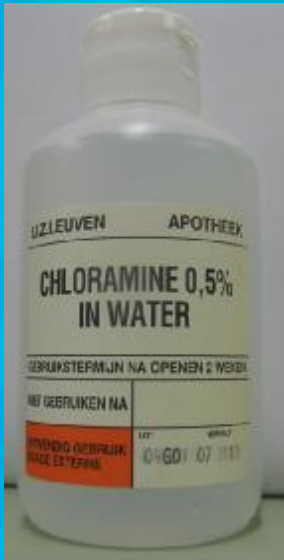




New measures ⁽¹⁾

- Increase of chlorine concentration

1200 ppm

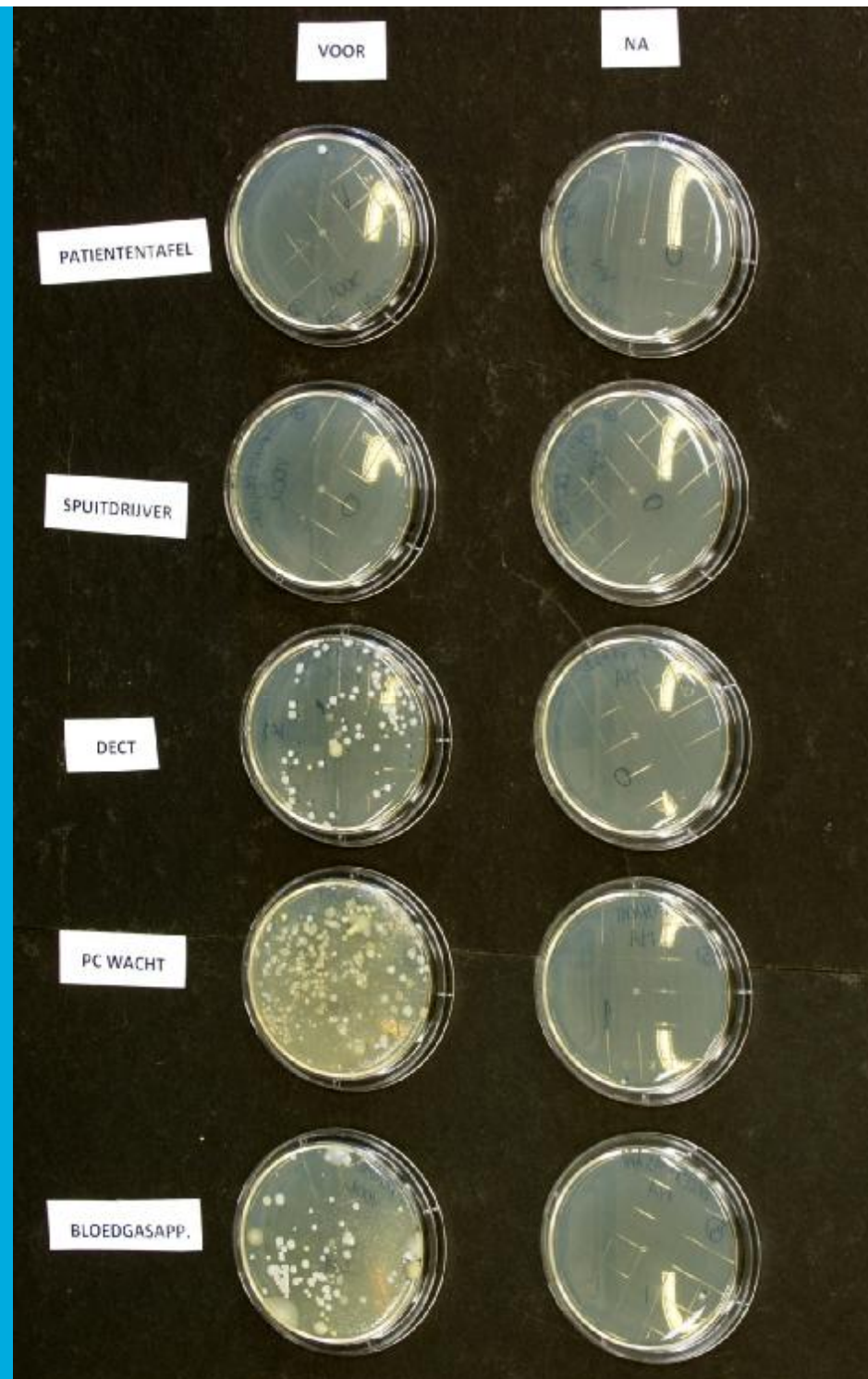


3000 ppm



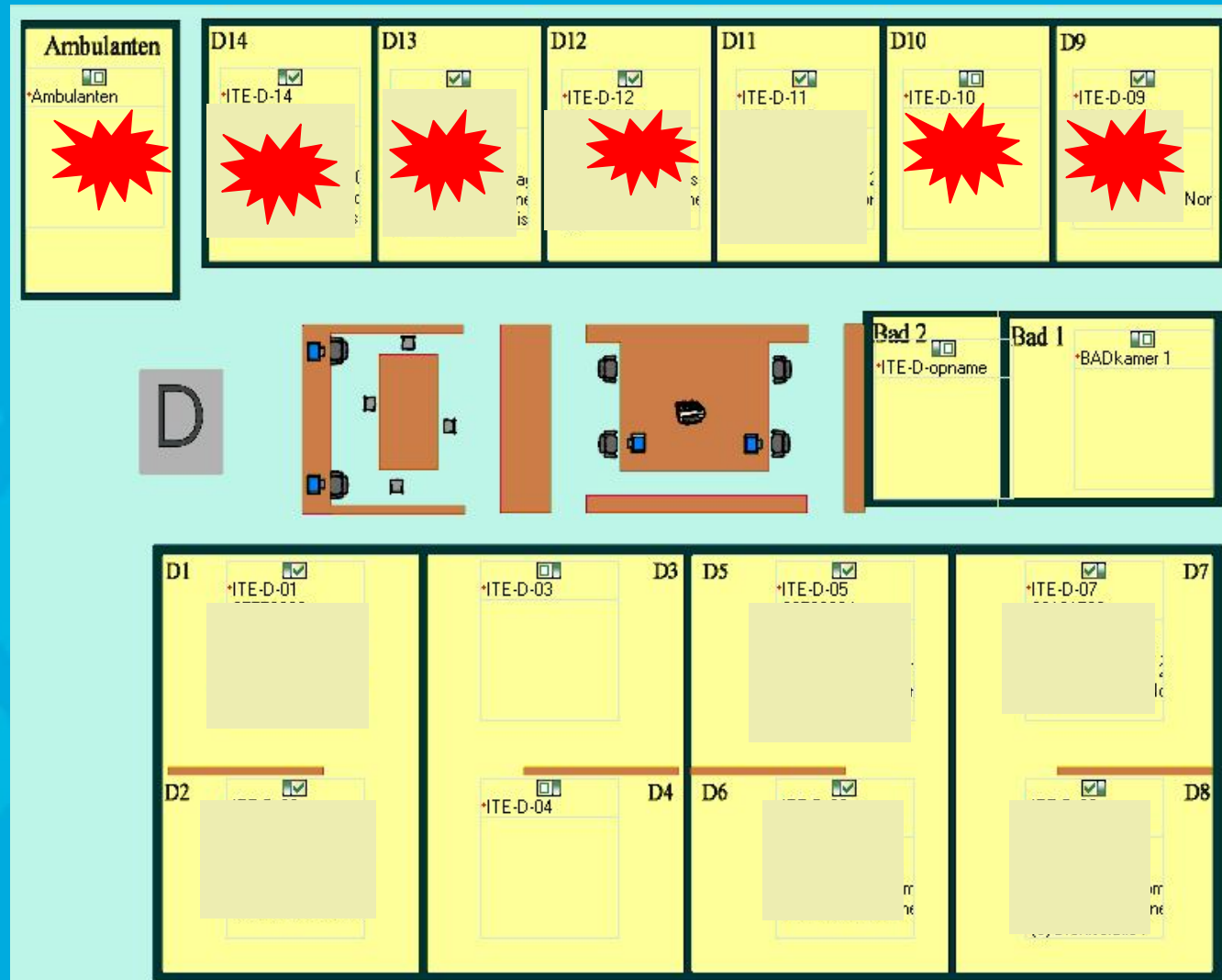
New measures (2)

- Observation of cleaning staff
- Microbiological analysis of fingertips



Follow-up

3 weeks after the start of the outbreak, 3 new colonizations





Multidisciplinary task force

- Head nurses and medical staff
- Cleaning staff
- Laboratory
- Technical department
- Infection control
 - All cases were reviewed
 - All hypotheses were retested
 - All control measures taken were evaluated
 - A new literature study was performed

New literature search



Bacterial contamination of nonsterile gloves before use. Am. J. Infect. Control. 2006 Apr; 34(3): 128-30.



⇒ Test of the new gloves, recently introduced

Study of the bacterial contamination of the disposable gloves and card board of the boxes

- Aseptic procedure
- Box and card board:
 - Rodac contact plates inside the box (top and bottom)
- Gloves:
 - Rodac contact plate of last but one
 - Glove juice method : immersion in broth – shaking - filtration

Results ⁽¹⁾

- Both gloves and card board were clearly contaminated by Bacillus sp. and B. cereus



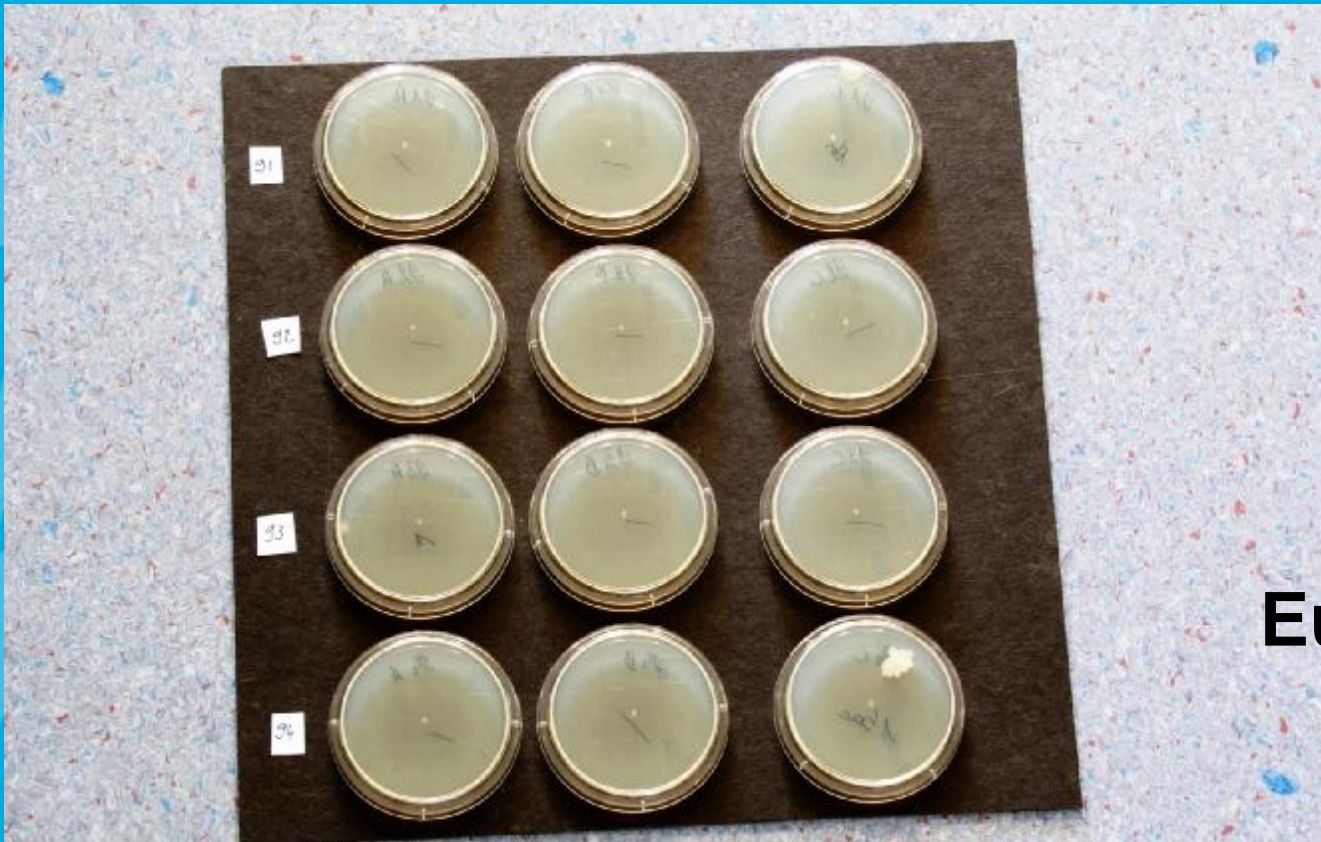
Boxes



Gloves

Results (2)

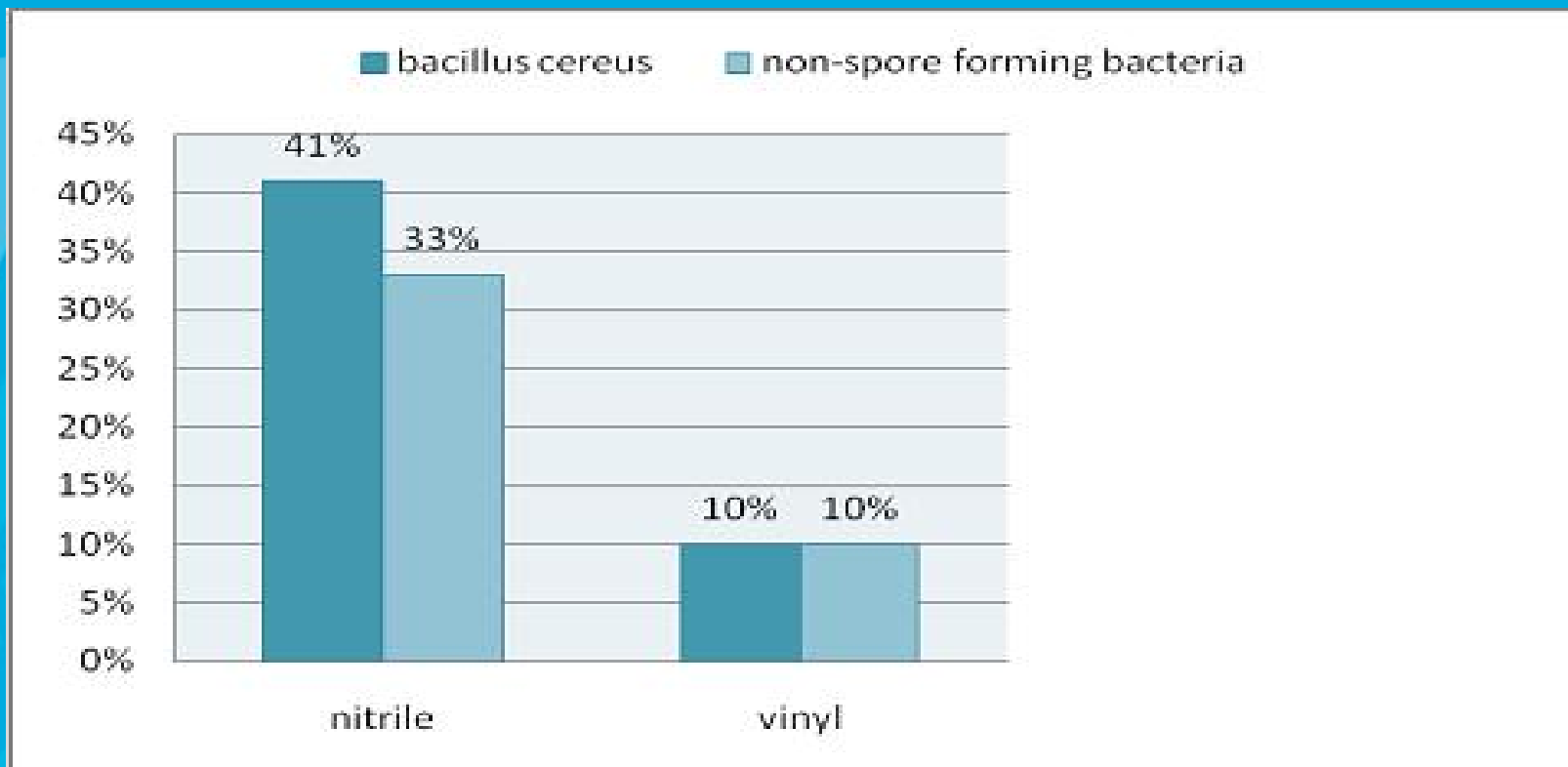
- Other types of nitrile gloves of the same supplier also contaminated
- Clear differences in contamination between suppliers



European gloves

Results (3)

- 56 boxes with gloves were tested with the glove juice method (2 gloves) :
 - 27 pairs of nitrile gloves
 - 29 pairs of vinyl gloves



Results (4)

- As described previously:
 - Disposable gloves can be contaminated by B.cereus and other non-spore forming micro-organisms
 - Gloves made of nitrile are significantly more contaminated than those made of vinyl
 - This maybe important for immunocompromised patients

Berthelot et al. Am. J. Infect. Control, 2006

Measures taken

- Contact with company and supplier
 - All nitrile gloves were removed from the UHL and Belgium
 - Immediate switch to safe vinyl and later to safe nitrile
 - Request of an urgent assessment of production process (HACCP)
 - Request of hygiene and safety plans of the manufacturer
- Microbiological confirmation by independent laboratory
- Standards for disposable gloves?
 - European guidelines and quality norms (EN 455 1-2) : only physical testing is required
 - No quality norms on bacterial contamination
- Cost of Quality?

Economic evaluation of the outbreak

- Minimal risk for the patient: no infections, only colonization
- Resources: ± 39.000 €
 - Laboratory: 8432 €
 - Cleaning staff: 21.709 €
 - Isolation : 6000 €
 - Damage of materials: 2700 €

Damage to materials

Connection of the bathtub



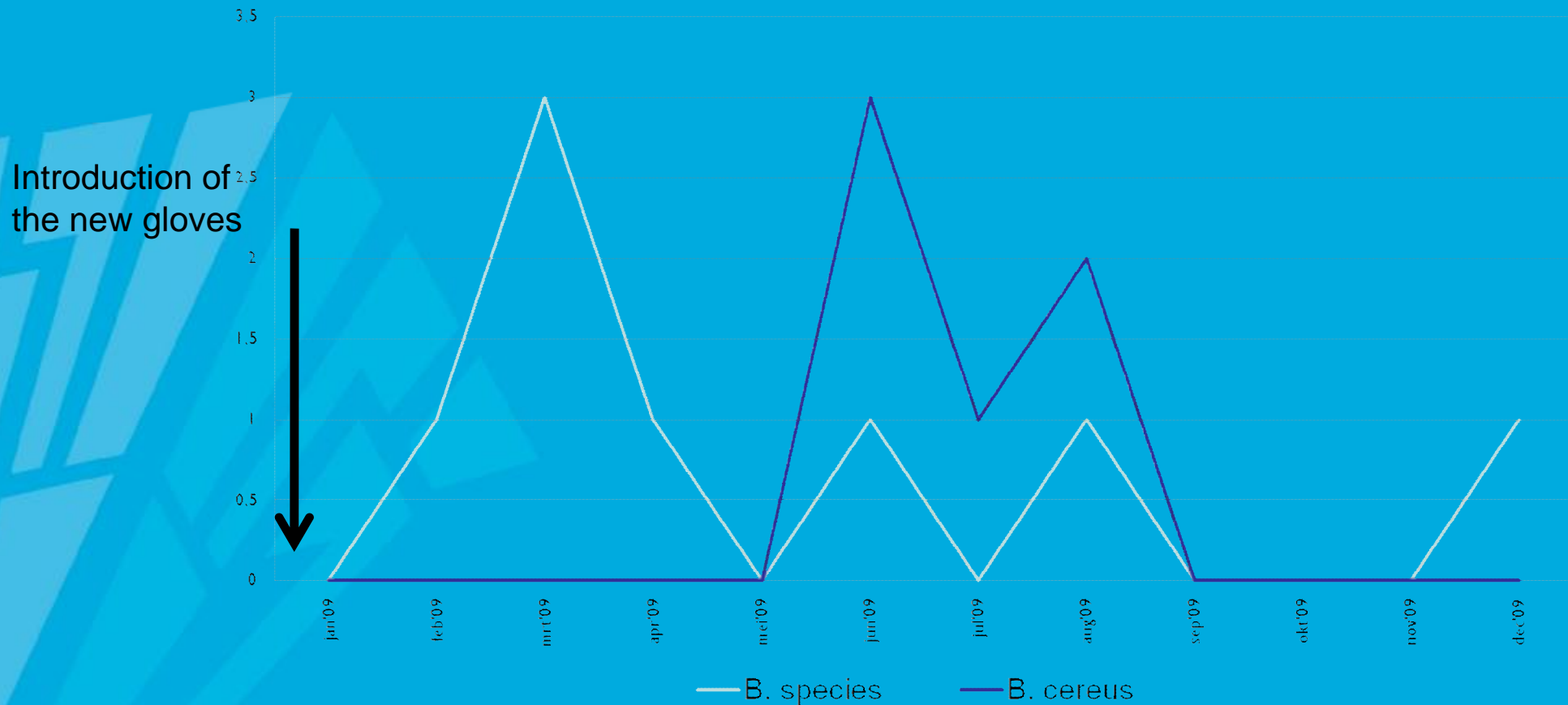
Stretcher



Conclusions (1)

Epidemic curve with return to the baseline

Number of patients colonized with *Bacillus* in the wounds in the burn unit in 2009



Conclusions ⁽²⁾

- Source was proven
- Normalisation of the environmental samples
- Typing of the isolates was not performed
 - Laborious (biotyping, serotyping and molecular typing possible for food-poisoning in Colindale, UK)
 - No additional information expected because of probable multiclonal nature
- Price negotiation and quality assurance

Norm proposition for the microbiological quality of disposable non-sterile gloves for patient care

- ≤ 1 CFU / Rodac contact plate
- ≤ 5 CFU with the Glove Juice methode in 200 ml VV9 (NaCl –tryptone) and filtration
- Absence of pathogens