Global perspective on Clostridium difficile  
with specific focus on Dutch infection prevention measures

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International consultant the Netherlands  
Chair international section APIC

The findings and conclusions in this presentation are those of the author

Google and AJIC Search
Top 10 Bacteria

<table>
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<th>Nr.</th>
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23 July 2013 on all languages
**Clostridium difficile (C. difficile)**

- 1935 1st detection in stool of babies
- Anaerobic Gram positive (rod) bacterium
- Spore-forming
- Toxin production
- Changing epidemiology
- Part of the environment
- Part of gut flora in animals and humans

**Gut flora**

- Part of a synergetic host-microbe relationship
- Contributes to the maintenance of a healthy host
- Essential for our survival (colonization resistance)
- Sometimes pathogens
- Largest human reservoir
Transmission & Contamination *C. difficile*

- Oral-Faecal
- Devices
- Environment
- Aerosols
- Hands

European Hospital and Healthcare Federation (HOPE)
Risk factors for Colonization & Infection with \textit{C. difficile} (\textit{many variables described})

- Old age (but children also)
- Gender (more females than men)
- Severe underlying illness
- Duration of admission
- Use of laxatives
- Use of gastric acid suppressants
- Manipulations to the digestive tract
- Faecal incontinence
- \textbf{Antibiotic use} (treatment and prophylaxis)

\textbf{C. difficile} infection (CDI)

\textit{C. difficile} associated disease (CDAD)

\textbf{Symptoms}

- Diarrhea profuse watery diarrhoea ($\pm$ blood)
- 50\% have fever & ↑ white blood cells
- Abdominal pain
- Pseudo membranous colitis
- Toxic megacolon
- Ileus
- Sepsis
- CDI caused or contributed to 40\% of deaths < 3 months of diagnosis
- \textbf{Recurrence of CDI occur in up to 25 \%}

### Global C. difficile

<table>
<thead>
<tr>
<th>Country</th>
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<th>Growing problem</th>
<th>National Guideline</th>
<th>Remarks</th>
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### C. difficile in Europe

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<td>United Kingdom</td>
<td>yes</td>
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<td>yes</td>
<td>Mandatory reporting (2007) and strict regulations</td>
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</table>

* No problem in most Mediterranean countries
CDI Survey 2008 in Europe:

- 34 European countries
- 97 Hospitals
- Incidence CDI 4.1 / 10,000 patient-days
  (range 0.0 - 36.3 / 10,000 patient-days)
- PCR ribotypes other than 027 are prevalent

The study is recently repeated and will be published


ECDC guidance document 2008

- Early diagnosis
- Surveillance
- Education and communication
- Isolation precautions
- Hand hygiene
- Protective clothing
- Environmental cleaning
- Use of medical equipment
- Good antibiotic stewardship
- Specific measures in outbreaks

http://www.ecdc.europa.eu/en/activities/sciadvice/Lists/ECDC%20Reviews/ECDC_DispForm.aspx?list-id=512f74fa2d77a4d4add92d6d92d4b30b0e50
C. difficile in Europe

- Little is known about the extent of C. difficile in whole Europe
- C. difficile is not on the list of communicable diseases for EU surveillance
- Incidence of C. difficile infection varied across hospitals
- Length of stay due to CDI varies among countries
  - England 16.09 days
  - the Netherlands 12.58 days
- Assuming the population of European Union to be 500 million, CDI can be estimated to potentially cost the Union €3 000 million per annum
- It is expected to almost double over the next four decades

Prevention Measures

1. Antibiotic stewardship
2. Hand hygiene
3. Cleaning & Disinfection

No international consensus about specific measures
Antibiotic stewardship

Hand hygiene
Cleaning & Disinfection

No action today, no cure tomorrow

WHO introduces a six-point policy package to combat antimicrobial resistance

http://www.who.int/world-health-day/2011/WHD201_FS_EN.pdf

Antibiotic Awareness Day

European Antibiotic Awareness Day is marked Annually since 2008 on 18 November

Monday 18 November 2013 Now Worldwide

European Campaigns
Use of Antibiotics in Hospitals: Europe 2012


Use of Antibiotics: the Netherlands

Use of antibiotics in livestock farming has decreased with 50% in the 1st half of 2012 compared to 2009

http://www.swab.nl/english
Prevention measures

- Antibiotic stewardship
- Hand hygiene
- Cleaning and disinfection

What is the Role of Role models?

WHO Guideline Hand Hygiene 2009

23.3 Jewelry
The consensus recommendation is to strongly discourage the wearing of rings or other jewellery during health care.


- Appropriate use and removal of gloves is crucial when dealing with patients with diarrhoeal illness, followed by hand washing with soap and water in case of C. difficile outbreaks.

http://www.who.int/gpsc/tools/faqs/system_change/en/
Hand hygiene Performance

Who?  How?  Where?

Order of importance
1. Technique
2. Duration
3. Used materials
4. Correct Gloving

Dutch WIP Guideline Hand Hygiene 2012

- No rings, wristwatches or bracelets should be worn
- Nor clothing with long sleeves

http://www.wip.nl/UK/
Poll question
Do you think hand jewellery, wristwatches and long sleeves obstruct good hand washing or disinfection?

• Yes
• No
• I do not know

Prevention measures

• Antibiotic stewardship
• Hand hygiene

• Cleaning and disinfection

Products, Materials and Methods are not always equal efficient…. 
Cleaning contributes to safe environment

BUT....
Not everything is always simple to clean
the Netherlands

<table>
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<tr>
<th>Issue</th>
<th>2013</th>
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<tbody>
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<td>Inhabitants</td>
<td>16,792,272</td>
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<td>65+</td>
<td>15%</td>
</tr>
<tr>
<td>Nursing homes</td>
<td>345</td>
</tr>
<tr>
<td>Hospitals</td>
<td>95 (8 academic)</td>
</tr>
<tr>
<td>Accredited Hospitals (NIAZ)</td>
<td>66</td>
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<tr>
<td>Length of stay</td>
<td>3.4 day</td>
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<tr>
<td>MRSA</td>
<td>1.8%</td>
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http://www.cbs.nl/

C. difficile in the Netherlands


- 18 participating centers
- 941 samples
- Incidence 15.4* / 10,000 hospital admissions (varying 3 to 29/10,000)
- 2 relatively large outbreaks and
- 10 small outbreaks (up to 4 isolates) were observed in 7 participating hospitals

http://www.rivm.nl/dsresource?objectid=rivmp:181821&type=org&disposition=inline&ns_nc=1
C. Difficile in the Netherlands

Free University Hospital Amsterdam, the Netherlands 2010  Beagle “Cliff” smells Clostridium difficile (toxin)

• Faster as lab results
• Positive in 90% of colonized & infected patients
• More study in progress


Dutch Guidelines Infection Prevention

• Free downloadable
• Dutch and English Language
• Short
• To the point

These guidelines are considered professional standards and are used as such by the Public Health Inspector

http://www.wip.nl/UK/
C. difficile in the Netherlands

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<td>1. Patient toilet hygiene</td>
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<td>2. General</td>
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<td>2.2 Cleaning the patient’s room</td>
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<td>2.3 Cleaning and disinfection</td>
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<td>3 Waste</td>
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<td>4 Epidemic situation</td>
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<td>Appendix A. References</td>
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C. difficile → Contact isolation
supplemented with a few extra precautions

- Single-patient room
- Non-sterile gloves
- Protective apron
- Hands must be washed with soap and water
- Stop Isolation
  only once the diarrhea has stopped for a period of 48 hours
- Own toilet (no sharing)
- Anteroom is not necessary
- After bedpan use, the nurse must the bedpan immediately empty, clean and disinfect in a bedpan washer

http://www.wip.nl/UK/free_content/Richtlijnen/00618860_Clostridium_uk.pdf
2.1 \textit{C. difficile} General Cleaning

- Cleaning should take place by means of a \textit{damp method} as much as possible, e.g. by using \textit{microfibre cloths}.

- The cleaning equipment must be patient-specific. If this is not possible, the room of the patient with \textit{C. difficile} should be cleaned last each day.

- The cleaning materials should be either disposable, and disposed of immediately after use,

- Or reusable, and washed in the washing machine immediately after use.

\texttt{http://www.wip.nl/UK/free_content/Richtlijnen/00618860_Clostridium.uk.pdf}

\textbf{C. difficile} Cleaning & Disinfection

- \textit{C. difficile} spores are resistant to the most commonly used surface disinfectants

- Studies confirm that disinfection with chlorine is only effective in very high concentrations, which involve occupational health & safety issues

- In practice the number of spores present may be lower than in effectiveness tests

- The conditions far less favorable because
  - the agent is applied to a surface
  - the contact time is difficult to achieve
  - and organic material may be present

\textit{Taking all this into account, the Working Party emphasizes the Importance of \textbf{optimal cleaning} of objects and the environment}

\texttt{http://www.wip.nl/UK/free_content/Richtlijnen/00618860_Clostridium.uk.pdf}
C. difficile Waste

• Waste from the patient’s room does not require any special processing and can be disposed of as normal industrial waste

After bedpan use, the nurse must the bedpan immediately empty, clean and disinfect in a bedpan washer

http://www.wip.nl/UK/free_content/Richtlijnen/00618860_Clostridium_uk.pdf

Safe Bedpan Management

1. Patient care
2. Transport of full bedpans and urine bottles
3. Emptying bedpans: manual or automatic
4. Cleaning: manual or automatic
5. Disinfection: manual or automatic
6. Drying: manual or automatic
7. Activity in dirty utility room /sluice room
8. Storage

In case of Negligent Bedpan Management

Risk for All Types of Healthcare Associate Infections
Bedpan Management
affects all the Links in Chain of Infection

Faeces: $10^{14}$ Microorganismen (including MDRO)

Breaking the chain with Basic Precautions:
Cleaning & Disinfection

- Portal of Entry
- Infectious Agent
- Susceptible Host
- Reservoir
- Portal of Exit
- Mode of Transmission

Bedpan Management
Affects all the Links in Chain of Infection

- 10% -30% of patients colonized with *C. difficile*
  - up to 70% have skin contamination
- Measures for patients with diarrhea often too late
- Reservoirs: - Infected and colonized patients
  - Inanimate objects (bedpan and urinals)
- Full bedpans contaminate hands & environment
- Bedpans & hands can transmit microorganisms
- Hands can contaminate environment & patients
- Poor cleaning and disinfection methods
Critical Items: Sterilization
Affect normally sterile tissues or the blood system and represent the highest level of infection risk.
Surgical instruments, catheters, probes, etc.

Semi-critical Items: High level disinfection
Second in importance and affect mucous membranes and small areas of non-intact skin and represent a high level of infection risk.
Anaesthesia equipment, endoscopes, etc.

Non-critical Items: Low Level disinfection
Items and practices that involve intact skin and represent the lowest level of risk: Bedpans, Blood-Pressure cuffs, etc.

Cleaning, Disinfection, Sterilization
Classification scheme: Spaulding, USA, 1968

Spauldings’ Scheme (1968) and HICPAC (2008)
Not sufficient for bedpans and urine-bottles

Bedpan & Urinals
The objective in the handling of bedpans & urinals is to dispose of the excreta under the most sanitary and least offensive conditions and at the same time to disinfect the utensils

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<th>PUBMED 2012</th>
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</table>
Bedpan Management in the Netherlands

1967  Ministry of Health advice: “bedpans have to be automatically cleaned, rinsed and sanitized with steam or hot water at least 1 minute for 80 °C.”

1980  Development of fully automatic bedpan washer disinfector (WD)

1990  1st Dutch survey: “bedpan washer disinfector - a forgotten problem?”

1995  Working Group Infection Prevention (WIP) developed guidelines for WD

1997  Innovation WD

2005  WIP guidelines: Validation

2006  International Standard BS- EN- ISO 15883 Part 1-6 WD

2010  - 2nd Dutch survey bedpan management

- 1st International survey bedpan management

International Bedpan Management Survey 2010

*Sent to: 1176 Hospitals in 116 Countries*

- Methods for emptying bedpans and urine-bottles?
- Manual or automatic cleaning and disinfection?
- Familiar with the international standard ISO 15883 for Washer disinfectors?
- Audits in Sluice room / dirty utility room?

- Did bedpans or WD play a role in outbreaks of HAIs?

Responding Countries: 55
USA: 16 Hospitals
Use of Washer Disinfectors (%)

- the Netherlands and Belgium: 100%
- West Europe: 97%
- South- and East-Europe: 34%
- Asia, Africa, Latin-America, Middle east: 24%
- Australia, New Zealand: 83%
- USA, Canada: 32%

Survey 2010 Bedpan management
KNIP Consultancy Infection Prevention
www.info@knip-consult.eu

Bedpans and or (not validated) WD
4–21 % played a role in outbreaks of HAIs
Bedpans and/or (not validated) WD 4–21% played a role in outbreaks of different types of HAIs

Reported Microorganisms
- Multi resistant *Pseudomonas aeruginosa*
- MRSA
- Norovirus
- *Salmonella* species
- *Clostridium difficile*

Nobody wanted (or was allowed) to make these findings public

Bedpan Management

Patient Care
Transport faeces and urine

**USA:** Occupational Safety & Health Administration (OSHA) 1910.1030(d) (2) (xiii)

- Specimens of blood or other potentially infectious materials shall be placed in a container which prevents leakage during collection, handling, processing, storage, transport, or shipping.

**Why not Precautions for transport of FULL bedpans?**
Daily Practice: Manual Emptying

Risk Healthcare Worker
- Hands
- Eyes
- Uniforms

Risk Environment
- Floors
- Walls
- Surfaces
- Clean items

Something hardly noticed

The Role of the Environment

- Growing appreciation that environmental contamination makes a contribution to Healthcare associated Infections with
  - MRSA
  - VRE
  - Acinetobacter species
  - Noro virus
  - Clostridium difficile
  - etc.

- Surface disinfection practices are currently not effective in eliminating environmental contamination

http://cleanspaces.site.apic.org/about-the-project/
Slop hoppers and spraying still in use

This slide: Martin Kiernan, UK Southport

Bedpan Cleaning with Water-sprayers, Brush or Rinsing water

Survey 2010: Bedpan Management
KNP Consultancy Infection Prevention
www.info@knip-consult.eu

APIC webinar 31 July 2013
Manual Cleaning and Disinfection

- Proper cleaning episode prior for disinfection?
- Frequency
- Product choice
- Misuse disinfectants (contact time, dosage, etc)
- Exposure risk
- Microbial contamination of prepared disinfectants?
- Exposure risk
- False sense of security
- Never a standard operated procedure (SOP)

To Err is Human, also in handling Bedpans

Cleaning
No Safe Procedures
**Drying**

**Potential Reservoirs if not dry**

Shape and Material of bedpans and urine bottles effects the cleaning and drying process.

---

**Dirty utility room**

- Separation Clean & Contaminated
- Efficient equipped
- Easily accessible
- Safe storage
Machinal Empty, Clean & Disinfection

- Standard operated procedure (SOP)
- Thermal disinfection
- Validation
- Continuous monitoring
- More reliable than chemical disinfection
- Green solution
  - No residues
  - Non-toxic

Safe Handling Human Waste

at Any Patient at Any time by Any HCW

International Standard Washer Disinfectors

- Part 1 General requirements
- Part 2 WD employing thermal disinfection for surgical instruments & anaesthetic equipment
- Part 3 WD employing thermal disinfection for human waste containers (bedpan washers)
- Part 4 WD employing chemical disinfection for endoscopes
- Part 5 Methods for demonstrating cleaning efficacy
- Part 6 Requirements and tests for WD

* BS British standards publications
EN In case European standards are published, national standards are automatically obsolete in the EC member countries
ISO (International Standard Organization) ISO members are the national standard organizations of all European countries, USA, Japan and many other countries
ISO 15883-Standard        WD-Part 3

Emptying
4.3.1 Manual emptying of containers should be avoided whenever possible

• Emptying when the door is closed
• Flushing /Rinsing with cold water
• Cleaning with warm water and correct dosage detergent
• Disinfection (A₀ 60) at least 1 minute 80° C.
• Cooling down
• Drying

Invisible Process
Only reliable with safe results
In case of validation and regular maintenance

Awareness ISO Standard 15883-WD

Survey 2010  Bedpan management
KNMP Consultancy Infection Prevention
www.info@knip-consult.eu
Poll question

Do you think it is important to integrate fecal management in *C. difficile* guidelines?

- Yes
- No
- I do not know

Thank you

With acknowledgement to all colleagues who shared their practice and knowledge with me

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