The Faecal Quandary – Bedpan Management in a Modern Age
Gertie van Knippenberg-Gordebeke, Netherlands
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The Faecal Quandary
"*Bedpan Management in a Modern Age*"

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Hosted by Paul Webber
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Disclaimer/Disclosure

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

Consultant current & past for:
Diversey the Netherlands, Hakerman Turkey, Medwaste Control the Netherlands
Meiko Germany, SCA Hygiene Products Sweden, Sigex Brazil

Florence Nightingale 'Lady with the lamp'
(12-05-1820 – 03-08-1910)

12 May International Nursing Day

- Founder professional nursing
- Advocate improvement of care & hygiene
- Improvement reduced mortality rate from 42% to 2%
- Author books & manuscripts*

** Notes on Nursing: What is and what is not*
** Notes on Hospitals: Sanitary techniques to medical facilities*

Do No Harm
Florence Nightingale & Hippocrates

2011

Healthcare Associated Infections (HAI)

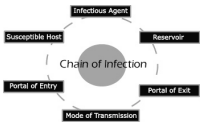
± 10% in Hospitals *(Netherlands 6,2%)*
> 25% on Intensive Care
> 25% in Low income countries

Harm what could be prevented

Risk Factors HAI

- *Antimicrobial resistance*
- *Human behaviour*
- *Staff-shortage*
- *Difference in medical- and nursing care structure*

- *Resource availability*
- *Lack of equipment*
- *Poor decontamination methods*
- *Deferred maintenance*
- *Lack of knowledge about the chain of infection*



Breaking the chain with basic precautions Nr.1

http://www.who.int/gpsc/5may/en/

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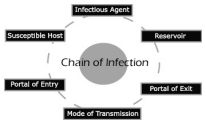

Breaking the chain with basic precautions Nr. 2

Cleaning & Disinfection

Every day, >2.5 billion people suffer from a lack of access to improved sanitation

Including in healthcare settings

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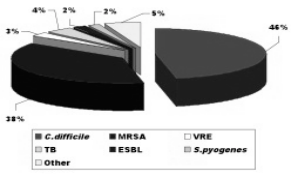
Clostridium difficile associated Disease (CDAD)

More cases of CDAD per year *(2009: 700 /yr)*

Versus:

ALL other bacterial *(as Shigella Salmonella etc)* enteric pathogens combined *(2009: 497 /yr)*



From Teleclass 2011:
Dr. Michelle Alfa, Canada

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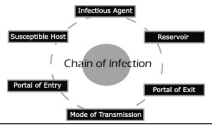

Faeces 10^{14} Micro-organisms

Including Multi Drug Resistant Organisms (MDRO)

- >10% of hospitalized patients may be colonized with *Clostridium difficile*
- Increasing prevalence of multidrug-resistance (MDR) among Gram-negative bacilli (GNB) & ESBL-producing GNB
- Transmission of nosocomial MDR GNB pathogens between patients involves a complex interaction of contaminated surfaces, clothing and hands of healthcare personal

Facing the rising tide of multidrug resistant Gram-negative pathogens,
Healthcare Infection 16(1) 1-5 Luke F. Chen*, Matthew E. Falagas and Anton Y. Peleg

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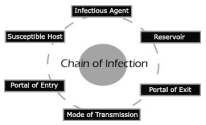

During bedpan management

Lots of Opportunities for Transmission & Contamination

- Full Bedpans Contaminate Hands & Environment
- Hands can contaminate Environment & Patients
- Contaminated Environment can contaminate Hands
- Bedpans & Hands can Transmit Microorganisms

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Not a new insight
1956 Book

John J. Perkins Director of Research American Sterilizer Company

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

Surfaces and commodes are often mentioned
in literature and lectures, but what about the bedpan?

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Surfaces & commodes are mentioned

What about the bedpan?

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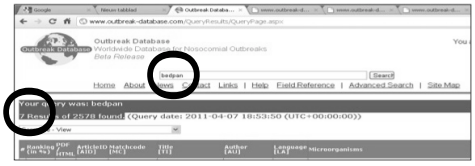
Publications & Bedpans

PUBMED		Topic	AJIC	
2008	2011		2008	2011
16	20	Bedpan and infections	-	22
12	14	Bedpan and nosocomial infections	-	13
1	3	Bedpan and hospital assoc. infections	-	19
0	1	Bedpan and healthcare assoc. infections	-	10
-	5	Clostridium and bedpans	-	7



e.g.: ***a wash basin from the bedpan-washing room, toilet flush handles, malfunction of the bedpan washer-disinfectors***

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Bedpan Survey 2010

- Survey sent by e-mail to 1176 hospitals in 116 countries *(2 reminders)*
- Questions included:
  - *Indentify empty and decontamination methods for bedpans*
  - *Audit sluice rooms*
  - *Identify if bedpans or Washer disinfectors (WD) has played a role in HAIs*
  - *Awareness of ISO15883 for WD*
  - *Specific national guidelines for handling bedpans*

Results presented in posters and shall be published

Survey 2010 Bedpan Management
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Bedpan Survey 2010

122	unroutable/ untraceable address
42	no answer, because no WD
74	another job career
21	no time to answer
17	not a subject for us
15	not allowed to answer
11	wished me good luck, no answer
9	language problems
965	no reply

(n1176)

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Responding Hospitals

Netherlands	77
Western Europe	34
East & South Europe	34
Africa, Asia, Latin America, Eastern Mediterranean Region	58
Australia, New Zealand	6
USA, Canada	25

(n1176)

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Responding Countries: 54

Beds in hospitals 25-2500

Aruba	1	Czech Republic	1	Iraq	1	New Zealand	4	Spain	4
Australia	2	Denmark	1	Israel	3	Nigeria	5	South Africa	1
Belgium	6	Egypt	12	Italy	11	Norway	5	Sudan	1
Botswana	1	Equador	2	Jordan	4	Oman	1	Sweden	8
Brazil	1	Estonia	1	Kosovo	1	Pakistan	3	Switzerland	3
Bulgaria	13	Germany	6	Lebanon	1	Puerto Rico	1	Thailand	2
Canada	9	Ghana	1	Lithuania	2	Qatar	1	Turkey	1
Cameroon	1	Hungary	3	Macedonia	1	Vietnam	1	UK	1
China	1	Ireland	2	Malaysia	1	Saudi Arabia	1	USA	16
Colombia	3	India	5	Malta	1	Singapore	1	Vietnam	1
Croatia	1	Indonesia	2	Netherlands	77	Slovakia	8		

- *These figures do not represent the world, but give an impression*
- *Netherlands 69% reply is the country where I know the hospitals*

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Responding Hospitals - 54 countries

- **13 Hospitals reported indwelling urine catheter and diaper instead of bedpans**
- **65% Nurses, assistant nurses or relatives empty bedpans manually into the toilet or slophopper; Even with a WD**
- **23% take specific measures in case of *Clostridium difficile***
- **Hospitals in Canada & USA:**
  - **8% single-use bedpans per stay, regular sprayed or rinsed after use**
  - **7% sent bedpans to the central sterile department for final decontamination**

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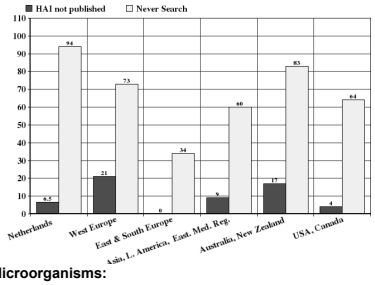
WD and bedpans as source of HAI



Reported Microorganisms:
Pseudomonas aeruginosa, MRSA, Clostridium difficile, Norovirus, Salmonella species

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Enteric Precautions

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Basic Precautions

Every patient must be treated as colonised or infectious

1. Handhygiene & personal hygiene
2. Cleaning & disinfection procedures
3. Aseptic technique
4. Laundry & waste handling
5. ***Careful human waste handling***

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WHO

Categories of health care waste

1. Pharmaceutical waste
2. Sharps
3. Radioactive waste
4. Genotoxic waste
5. Chemical waste
6. Pathological waste

7. Infectious waste

Suspected to contain pathogens, from isolation wards, materials or equipment that have been in contact with:

- **infected patients**
- **excreta contaminated with potentially infectious fluids or blood**

How do we recognize infected patients ?

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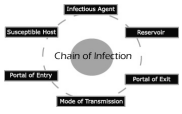
All kind of human waste containers as bedpans, urinals, etc affects Every Link in the Chain



- Direct patient contact (contaminated & infected)
- Full of MDRO & fluids from patients
- If not cleaned properly: a huge reservoir
- Transmission trough the hands
- Contamination during manual handling

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Guidelines and rules for Bedpan Management

North Carolina Department of Environment and Natural Resources (2003)
Rules Governing the Sanitation of Hospitals, Nursing Homes, Adult Care Homes and Other Institutions
(15A NCAC 18A 1300)

- Where bedpans are cleaned in patient rooms, minimum bedpan cleaning facilities shall consist of a toilet room with bedpan lugs or spray arms.
- Where facilities for cleaning bedpans are not provided in patient rooms, bedpans shall be taken to a soiled utility room to be cleaned and disinfected using an EPA registered hospital disinfectant after each use.

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Guidelines and rules for Bedpan Management

Management *Clostridium difficile* Infection *2010 UK, Portsmouth NHS Trust*

- All urine or faeces should be disposed of in the macerator as rapidly as possible.
- cleaned and disinfected with actichlor plus as described in appendix 1, with careful attention to toilets, bathrooms and sluices,commodes and bedpans.

Guidance on Prevention and Control of *Clostridium difficile* Infection in Healthcare Settings in Scotland *2009 Health Protection Network Scottish Guidance*

All care equipment should be carefully cleaned and disinfected using a sporocidal agent (with 1000 ppm hypochlorite) immediately after use on a CDI patient

Ontario Best Practice Manual Cleaning, Disinfection and Sterilization In All Health Care Settings **Reviewed and revised February, 2010**

Disinfection or sterilization may be reprocessed in a washer-disinfector(e.g., bedpans)

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Guidelines and rules for Bedpan Management

Quality assurance of Flusher and Washer Disinfectors 2009
Local guidelines in Sweden

- *Basic hygiene routines are the most important preventive measures regarding healthcare infections. They must be unconditionally applied in all healthcare situations and by all personnel, regardless of patients' diagnoses and healthcare settings.*
- Always disinfect your hands before taking out the clean goods from disinfector!

Dutch Guidelines Working Party Infection Prevention (WIP) the Netherlands

Infection prevention measures for Clostridium difficile: **July 2006** *Revision late 2011*
In that case a bedpan must be used, which the nurse must then immediately empty, clean and disinfect in a bedpan washer

Bedpan Washer: July 2007 (1st 1998, update late 2011 http://www.wip.nl/UK

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Decontamination

Process that reduces the number of pathogenic micro-organisms from inanimate objects or skin to a level which is not harmful to health

- Cleaning
- Disinfection
- Sterilisation

The choice depends on:
- Budget
- Knowledge
- Risk of infection to patients & HCW
- Risk for environment
- Risk of damaging the utensils

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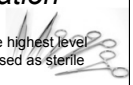
Spaulding's Classification Scheme (1968)
cleaning , disinfection, sterilization



Critical Items
Affect normally sterile tissues or the blood system and represent the highest level of infection risk. Most of the items in this category should be purchased as sterile
Surgical instruments , catheters, probes , etc.

Semi-critical Items
Second in importance and affect mucous membranes and small areas of non-intact skin and represent a high level of infection risk. These medical devices should be free from all microorganisms; however, small numbers of bacterial spores are permissible *Anaesthesia equipment, endoscopes ,etc .*

Non-critical Items
Items and practices that involve intact skin and represent the lowest level of risk
Bedpans, *blood pressure cuffs etc.*

One problem with implementing this scheme is: oversimplification

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Efficiency of disinfection depends on:

- Material and design of the items
- Organic and inorganic load present
- Level of microbial contamination
- Cleaning episode prior for disinfection
- Reliability of the chosen method
- Exposure time
- Frequency

To err is human…
also in decontamination bedpans

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Manual Chemical disinfection

- Different (inter)national guidelines
- Frequency not clear
- Product-choice
- Exposure risk
- Time consuming procedure
- Expensive
- False sense of security
- Unpopular task
- No correct use disinfectants
- Microbial contamination of prepared disinfectants?
- Never a standard operated procedure

NOT a SAFE procedure!

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Machinal disinfection preferred

- Standard operated procedure (SOP)
- Thermal disinfection
- Validation
- Continuous monitoring
- More reliable than chemical disinfection
- No residues
- Non-toxic for human beings
- Non-toxic for environment

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Bedpan Management

1. Patient care
2. Transport to Empty
3. Emptying
4. Flushing
5. Cleaning
6. Loading in WD
7. Disinfection
8. Drying
9. Storage

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Patient care

"My aide has a great sense of humor, but you'd never guess it from his bed pan delivery."

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Transport to empty

Not as simple as we might think

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Transport to empty

OSHA, USA
Occupational Safety & Health Administration

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 no precautions
for transport full bedpans?

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Emptying

Environment often not cleaned afterwards

- *Some MO survive months on dry surfaces*
- *Some MO survive months moist environment*

Spores <u>if not cleaned & removed</u> can survive

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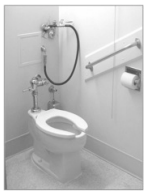
Sink & Slop hoppers still in use

- Flush
- Rinse
- Water spray
- No Disinfection
- Manual Handling
- Splash, Splatter, Aerosols



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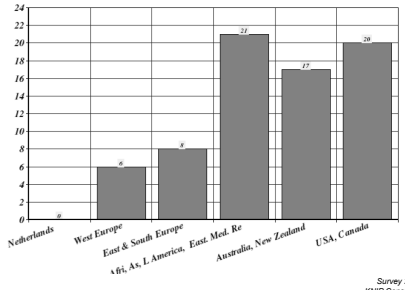
Cleaning with
water-sprayers, brush or rinsing water (%)



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Daily Practice Manual Handling

Risk Healthcare Worker
- Hands
- Eyes
- Uniforms

Risk Environment
- Floors
- Walls
- Surfaces
- Clean items

Something hardly noticed

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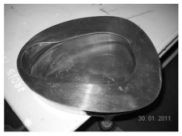
Cleaning



Not always safe procedures

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Manual Cleaning

Only 50% of surfaces is touched by Manual Cleaning

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Loading WD

Malpractice

Best Practice

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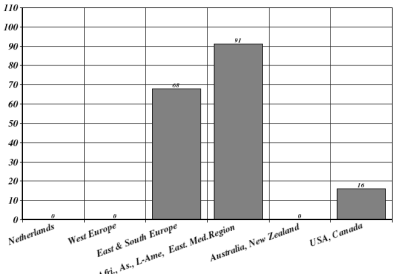
Manual disinfection of bedpans (%)



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Manual handling:
Protect HCW from exposure

- Hazard communication
- Proper work practices
- Ergonomics
- Responsibility
- Use of Personal Protective Equipment (PPE)

OSHA, USA : Occupational Exposure
means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials
that may result from the performance of an employee's duties.

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OSHA, USA
Occupational Safety & Health Administration

Other Potentially Infectious Materials means

1. The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids;
2. Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and
3. HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

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Drying

Potential Reservoirs!

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Storage

- No separation clean & contaminated
- Not much attention
- Full room
- Not recognized

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Sluice rooms differs a lot

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Risk: Slophoppers

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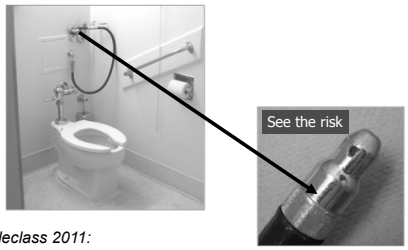
Risk: Bedpan sprayers

Aerosolisation of fecal material

major concern when bedpan sprayers are being used



From Teleclass 2011:
Dr. Michelle Alfa, Canada

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Requirements
Dirty utility room / sluice room

- Reasonable distance from patients' rooms
- Hand hygiene dispensers available
- Connection to drainage for WD
- Possibility to separate clean and not clean
- Protection against recontamination
- Easy to maintain and to clean

A well planned sluice room plays a role in infection prevention

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Audit Dirty Utility / Sluice Room

Minimal once a year Safety Inspection

- Focus on **what people DO**
- Separation between clean & not clean
- Take photographs
- Use nose and eyes
- Microbial check ?

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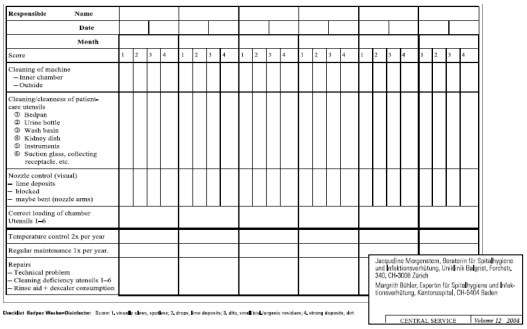
Audit & Feedback WD



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2006: Washer Disinfector (WD)

BS-EN-ISO 15883-Standard Part 1-6

- **Part 1** General requirements, terms and definitions and tests
- **Part 2** Requirements and tests for WD employing thermal disinfection for surgical instruments, anaesthetic equipment,
  Part 3 Requirements and tests for WD employing thermal disinfection for human waste containers
- **Part 4** Requirements and tests for WD employing chemical disinfection for thermo-labile endoscopes
- **Part 5** Test soils and methods for demonstrating cleaning efficacy
- **Part 6** Requirements and tests for WD employing thermal disinfection for non-invasive, non-critical medical devices and healthcare equipment

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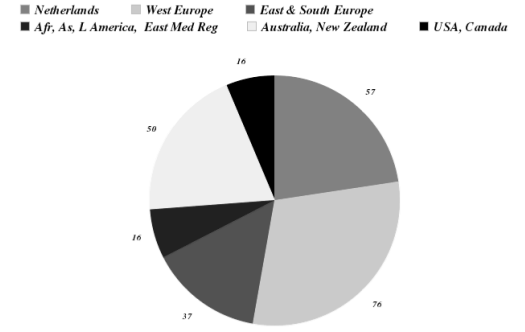
Awareness of ISO 15883 WD



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2006: Washer Disinfector (WD)
BS EN ISO 15883-Standard Part 1-6

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

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WD ISO/FDIS 15883 - Part 3

Human waste containers

1. Emptying behind closed door
2. Flushing
3. Cleaning
4. Thermal disinfection
5. Rinsing
6. Drying

Intended for reusables such as:

- Bed pans, Urine bottles, Suction bottles etc.

ORGANISATION INTERNATIONALE DE NORMALISATION
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

http://www.iso.org/iso/home.htm

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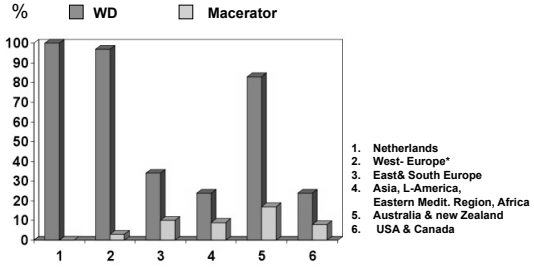
Use of WD & Macerator (%)



1. **Netherlands**
2. **West- Europe***
3. **East& South Europe**
4. **Asia, L-America, Eastern Medit. Region, Africa**
5. **Australia & new Zealand**
6. **USA & Canada**

2* In UK many Macerators, only 1 hospital responded

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Washer Disinfectors

Safe Handling Human Waste
at Any Patient at Any time by Any HCW

- Safer results than manual reprocessing
- Prevention of transmission MRSA, C.diff, & MDRO
- Visual Clean product
- No Odour
- Validated Thermal Disinfection
- Saves Nursing Time
- Easy to use
- Common in North-West European Healthcare
- Protects the HCW from exposure
- Prevents Contamination Environment & Hands

Note: ***Sufficient Electricity, Water supply and Sewage connection***

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Washer Disinfectors

Validation & Maintenance
to ensure a SAFE cleaning & disinfection

- Steam / hot water
- Water supply
- Monitor temperature
- Monitor duration time
- Loading
- Written record of maintenance must be kept

Minimize Risk *Clostridium difficile* spores

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Validation & Maintenance in the Netherlands 2010

		A%	B%	C%
Regular Maintenance (N=18)	A=1x per year B= 2x per year C= NO	33%	67%	0%
Validation (N=18)	A= Yes B= NO	83%	17%	
Validation done by (N=15)	A= Manufacturer B= Externalcomp. C= Internal Tech dep.	54%	33%	13%
In Contract/ protocol				
Kind of measurement Validation (N=14)	A= Yes B= No C= Unknown	57%	7%	36%
Frequency Validation (N=15)	A= Yes B= No	87%	13%	
Frequency validation				
Validation after repair (N=15)	A= Yes B= No	21%	79%	
Validation after preventive maintenance (N=15)	A= Yes B= No	64%	36%	
Periodical Validation (N=15)	A= Yes B= No	36%	64%	

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Audit & Feedback WD

Cleaning Loading Maintenance

Who is Responsible?

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Optimize bedpan management

- *Education WD*
- *System change WD*
- *Motivation WD*

the mind wants change,
the head wants progression,
and the heart wants to keep what it got

Prof.dr. Andreas Voss

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Education for handling bedpans

- To all Nurses, housekeeping and cleaning staff
- Regular education & practical training
- Chain of infection & preventive measures
- Risk to contaminate and transmit MO
- Hand hygiene (minimize handling)

- Work together with patient safety department
- Cooperation between healthcare & manufacturers

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Education & protocols in the Netherlands

N= 18			
		A	B%
Education			
Training handling WD	A= User gets training for handling WD B= User gets no training for handling WD	94%	6%
Training loading WD	A= User gets training for laoding B= User gets no training for laoding	89%	11%
Education handling with error WD	A= User gets training for handling WD B= User gets no training for handling WD	83%	17%
Protocols			
Instruction card loading WD	A= available B= not available	91%	9%
User manual WD	A= available B= not available	50%	50%
Instruction card procedure error	A= aanwezig B= niet aanwezig	39%	61%

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System-change for handling bedpans

- Used bedpans must be covered during transport to utility room
- Restriction disinfectants
- Store clean separated from not clean
- WD installed in dirty utility rooms
- *Say YES to system-change*

- Work together with patient safety department
- Cooperation between healthcare & manufacturers

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The Faecal Quandary – Bedpan Management in a Modern Age
Gertie van Knippenberg-Gordebeke, Netherlands
Sponsored by Meiko (www.meiko.de)

Machinal Disinfection is preferred

WHY ?

- Mechanical cleaning (*no hands involved*)
- Thermal disinfection
- Validation
- Continuous Monitoring
- More reliable than chemicals
- No residues
- Non-toxic

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Motivation for WD

- WDs are safer for Patients & HCWs
- Nurses hands are made for Care
  Not for Manual Emptying & Cleaning Bedpans and Urinals
- Saves time
- Less Odour
- Nurses must realize their specific role
- Nurses can play an important roll in demanding for WD

- Work together with patient safety department
- Cooperation between healthcare & manufacturers

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Requirements bedpan choice

- Need for patient bound bedpans?
- Comfort for patient & HCW
- Safe transport with lid /cover and firm grip
- Easy to empty, clean & disinfect (seamless)
- Long lasting
- Heat resistant
- No water residue after process

Bedpan types difficult to carry, clean or dry

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Spaulding's Scheme

NOT sufficient for handling bedpans

- Bedpans can come in contact with mucous membranes (the genital area) or non-intact skin (decubitus, wounds)
- Full bedpans & urinals are contaminated inside & outside
- Risk during Emptying with splatter, splash and aerosol is not mentioned
- Manual decontamination is never a standard operated procedure (SOP)
- Compliance Hand hygiene is (still) low
- Mis-use and over-use liquid chemical disinfectants

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Urine Catheters & Diapers for bedridden adult patients without medical indication should

NEVER Replacements for Use Bedpans & Urinals

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Budget for WD

Bedpan Washers are **Not Yet**
everywhere on the budget priority list
DEMAND FOR IT !

1. *First they ignore you*
2. *Then they laugh at you*
3. *Then they fight you*
4. *Then **you** win!*

Mahatma Gandhi, India

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The Faecal Quandary – Bedpan Management in a Modern Age
Gertie van Knippenberg-Gordebeke, Netherlands
Sponsored by Meiko (www.meiko.de)

Costs 1 patient with CDAD

Results: cost vs. re-imbursement

	Fälle (n = 45)	Kontrollen (n = 135)
cost per patient (€)	53,995	47,138
re-imbursement per patient (€)	47,888	45,734
financial loss per patient (€)	6,107	1,404
financial loss per patient day (€)	165	51

27 Fatih Feler Vonberg Institute for Medical Microbiology and Hospital Epidemiology Hannover Medical School — Vonberg J.Hosp.Infect. 2008; 70: 15 — MHH Hannover Medical School

Worthwhile to Invest in WD

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Resume Bedpanmanagement

Issue	Manual handling _	Machinal handling
Odour/Smell	Bad smell	No smell
Emptying content	Via toilet or slop hopper into sewer	Behind closed doors into sewer
Occupational safety	Exposure Splash, Spills Aerosols	No exposure
Contamination	Environment, hands	No risk
Flushing	Splashes, spills, aerosols	Behind closed doors
Cleaning	Spraying, soaking, brushing	100%
Disinfection	No monitored liquid disinfectant	Monitored thermal >80 ºC/ 176ºF
Effectiveness	Only 50% affected	Standard Operated Procedure
Drying	(Dirty, wet) Towel	Automatically
Validation process	No	Yes
Chemotherapy in urine	Exposure risk HCW	No risk for HCW
Environment	Chemicals cause risk	Environmental protection
Residue Spores C.diff	Possible	Reduction factor ≥ 4log.
(Human) Error	Possible	Possible

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Bedpan Management

- Focus on the current practice of handling bedpans
- Process improvements related to health-economics and methodology
- Develop specific guidelines for handling bedpans with or without WD
- Only validated & maintained WDs are effective for safe decontamination
- More study is needed for the role of bedpans and WD related to HAI
- Awareness rising & implementing WD ISO Standard 15883 for bedpans
- WD prevents healthcare personnel from a nasty unaesthetic job
- Architectural design for sluice rooms with space for WD

Requirements WD:
Sufficient Electricity, Water supply and Sewage connection

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Thank you

- All who shared with me pictures, slides, knowledge, support & advise
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- All attendees of this teleclass

Do no harm includes bedpan management

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COMING SOON …

19 May 11	**Human Factors Engineering Applications for Infection Prevention and Control** Speaker: Dr. Hugo Sax, University of Geneva Hospitals Sponsored by GOJO (www.gojo.com)
26 May 11	**Safe Injection Devices: 10 Years Out … Where are the Gaps?** Speaker: Ed Krisiunas, WNWN International Inc.
30 May	(Free Teleclass – Live Broadcast from CHICA-Canada Conference) **Benchmark and Performance Measurement** Speakers: Zahir Hirji, Bridgepoint Hospital (Toronto) and Leslie Forrester, Vancouver Coastal Health Sponsored by GOJO (www.gojo.com)
9 June 11	**Using Checklists to Prevent Healthcare Associated Infections** Speaker: Prof. Peter Pronovost, Johns Hopkins University Sponsored by: Virox Technologies Inc (www.virox.com)
14 June 11	(Free Teleclass – 10th Anniversary Lecture) **Ten Years of Infection Prevention and Control: How Far Have We Come?** Speaker: Prof. Syed A. Sattar, University of Ottawa Sponsored by: Virox Technologies Inc (www.virox.com) and Diversey (www.diversey.com)

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