Live broadcast from the Infection Prevention Society Conference 2021

Past, present & future

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Webber Training 20 Years Anniversary

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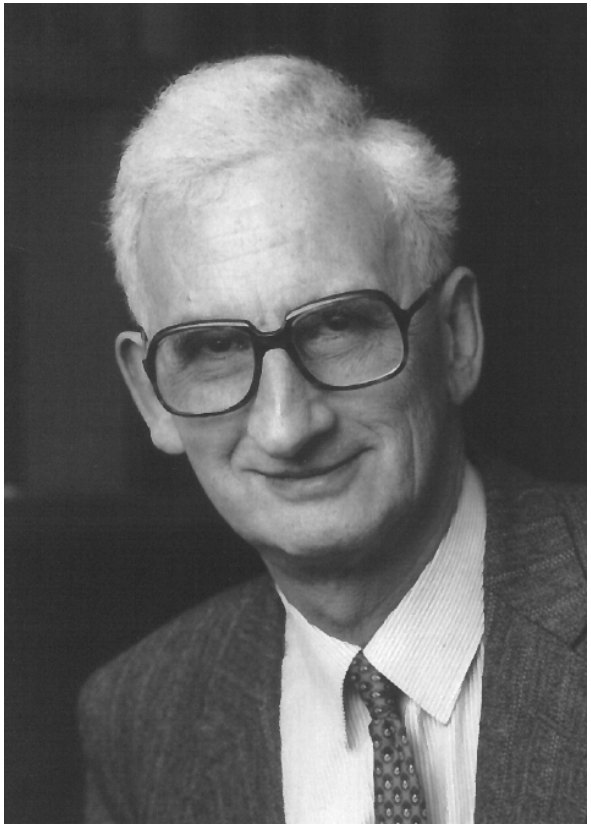
September 29, 2021

The Ayliffe lecture, IPS 2021



THE DISINFECTION OF BATH WATER WITH HEXACHLOROPHANE

G. A. J. AYLIFFE
M.B., B.Sc. Brist.
REGISTRAR IN PATHOLOGY

V. G. ALDER
B.Sc. Brist., F.I.M.L.T.
BACTERIOLOGIST

W. A. GILLESPIE
M.A., M.D. Dubl., F.R.C.P.I., D.P.H.
CLINICAL PATHOLOGIST

ROYAL INFIRMARY, BRISTOL

THE LANCET 26 SEPTEMBER 1959

Hand disinfection: a comparison of various agents in laboratory and ward studies

G. A. J. Ayliffe, J. R. Babb, J. G. Davies and H. A. Lilly*

Journal of Hospital Infection (1988) **11**, 226–243

Should the government's deep cleaning hospitals programme have been evaluated?

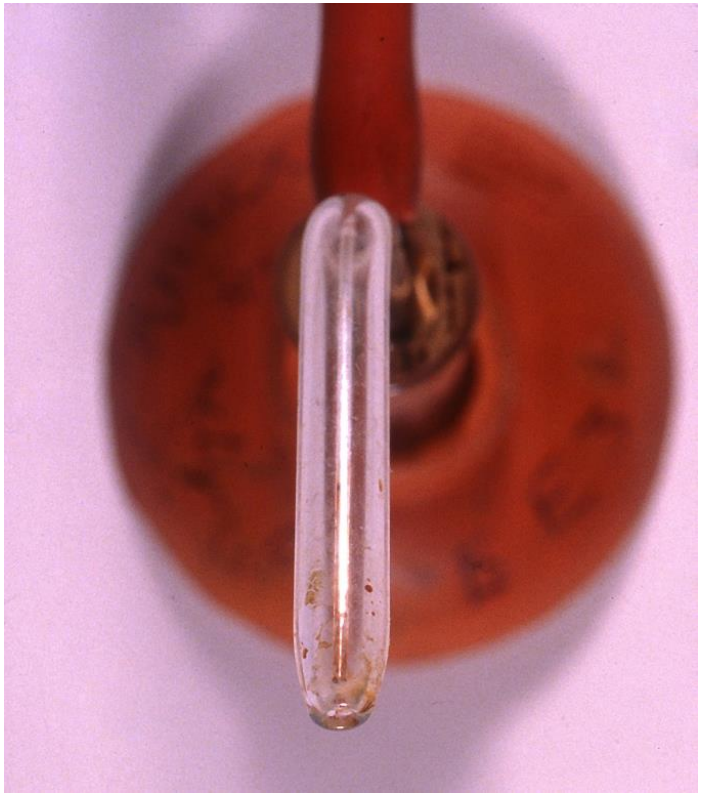
Journal of Infection Prevention, 2009

Past, present & future?

- How things were
- Where we are now
- Speculation on the future and a personal view of what problems will continue to keep us interested
  - Traditional curse: "*May you live in interesting times*"

ENT outpatients, late 1980s

On closer inspection

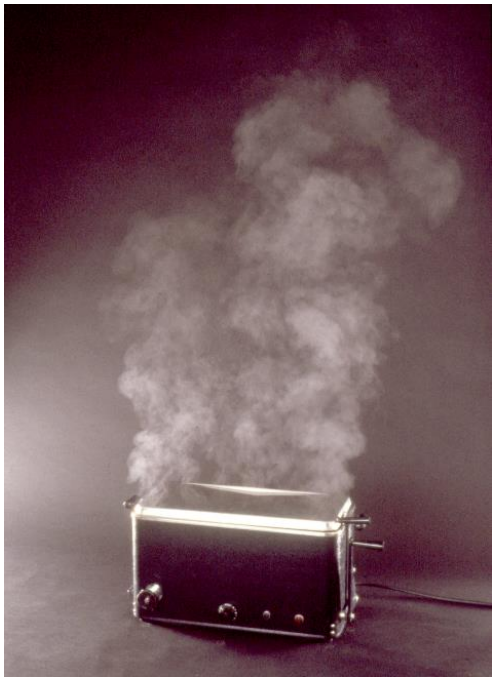


Decontamination in general practice - 1988

Control of infection in general practice: a survey and recommendations

P N Hoffman, E M Cooke, D P Larkin, L J Southgate, R T Mayon-White, J V S Pether, A E Wright, D Keenlyside

BMJ VOLUME 297 2 JULY 1988

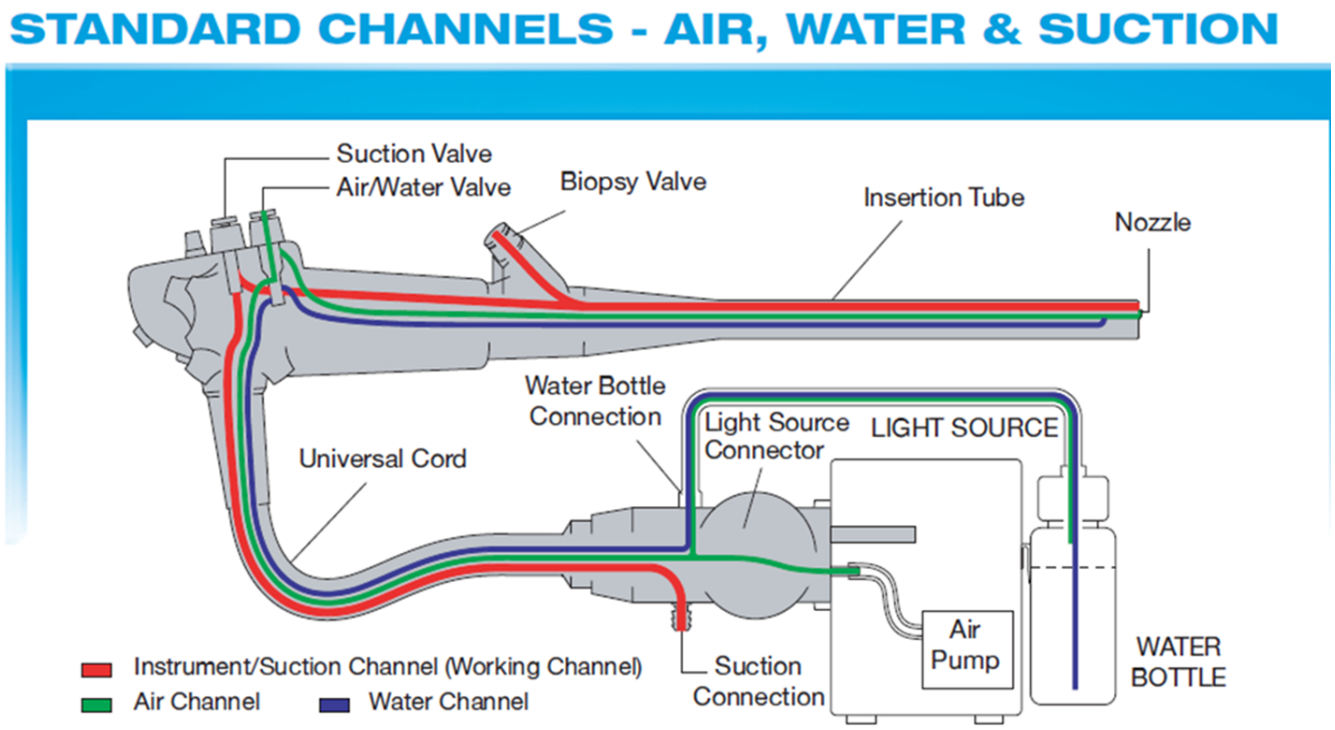


	Recommended methods	Acceptable alternatives
Medium risk items:		
Vaginal speculums	Sterilise or single use	Boil if suitable or none
Fitting rings/diaphragms		
Ring pessaries		
Proctoscopes/ sigmoidoscopes		
Auriscope "nozzles"		
Laryngeal mirrors		
Nasal speculums		
Tongue depressors		
Peak flow meter mouthpieces		

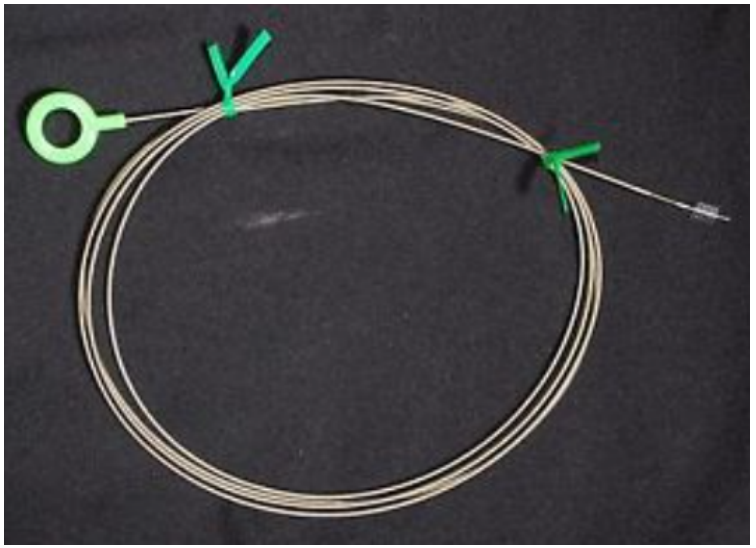
20 practices in the survey …… Five practices had autoclaves, one had a hot air oven, 13 had hot water disinfectors (one used both an autoclave and a hot water disinfector), and two had no means of heat decontamination; one of these practices, however, could have instruments sterilised in a 'Local hospital's central sterile supply department.

Risk category	Overall decontamination assessment (%) (actual numbers in parentheses)		
	Satisfactory	Doubtful	Unsatisfactory
High	56 (60/108)	31 (34/108)	13 (14/108)
Medium	56 (106/190)	32 (61/190)	12 (23/190)
Low	83 (24/29)	17 (5/29)	—

Endoscopes


STANDARD CHANNELS - AIR, WATER & SUCTION
Suction Valve
Air/Water Valve
Biopsy Valve
Insertion Tube
Nozzle
Water Bottle Connection
Light Source Connector
LIGHT SOURCE
Universal Cord
Air Pump
WATER BOTTLE
Suction Connection
Instrument/Suction Channel (Working Channel)
Air Channel
Water Channel

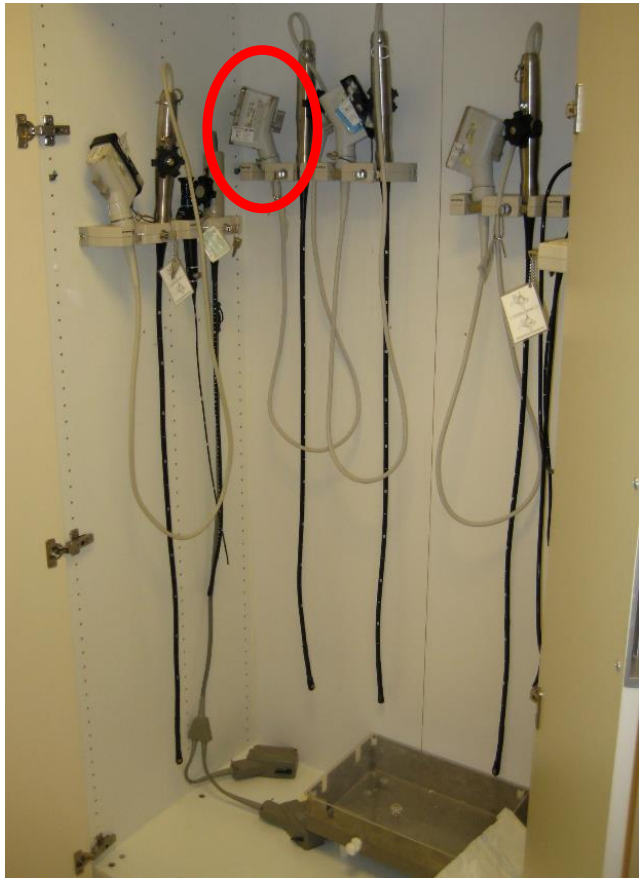
Late 1970s - gastroscopy



Endoscope decontamination

- Multiple changes in practice – manual cleaning followed by endoscope washer-disinfectors (automated endoscope reprocessors)
  - Cleaning and disinfection of outside surface and within channels
- A lot of guidance (e.g. Health Technical Memorandum 01-06, 5 volumes, 244 pages)
- Whilst there are multiple recorded global outbreaks/incidents due to inadequate endoscope decontamination, very few are recent UK
- Endoscope decontamination is nowhere near the QA of sterilized surgical instruments, but we seem to get away with it
- Other areas of decontamination are less well addressed

Transoesophageal echocardiography (TOE/TEE) probes



5 April 2012 Last updated at 13:17

Morriston Hospital hepatitis B death: Lessons learned, says ABM health board

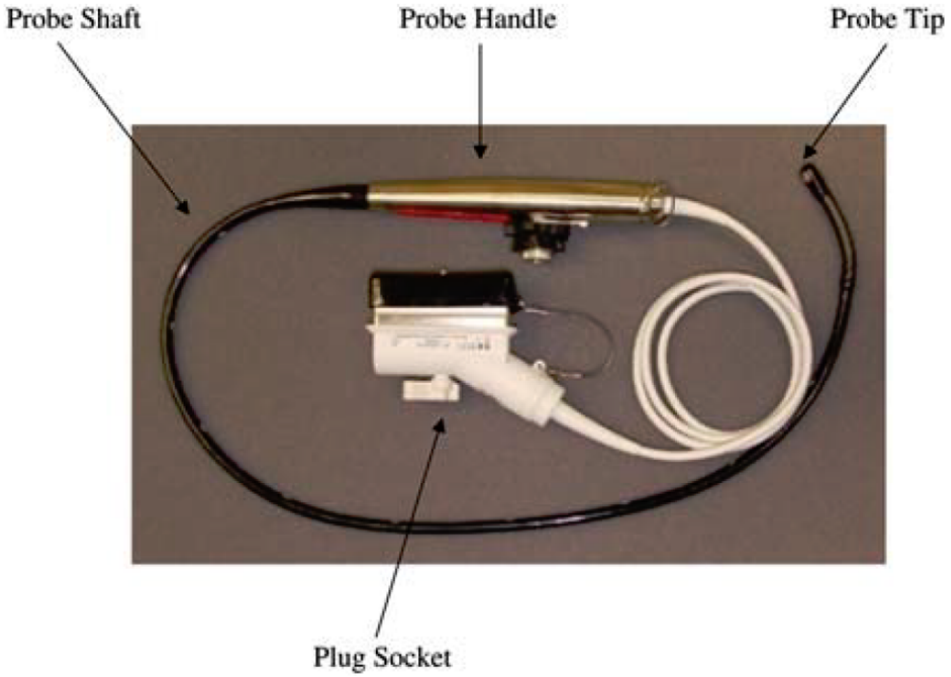
A cardiac patient who died after contracting hepatitis B at a Swansea hospital did not receive a high standard of care, say health chiefs.

An independent external review panel was asked to investigate the circumstances surrounding the hepatitis B infection.

The panel has made several recommendations about decontamination, infection prevention and control, staff training and auditing procedures.

It found that the most likely cause of the infection was a contaminated probe.

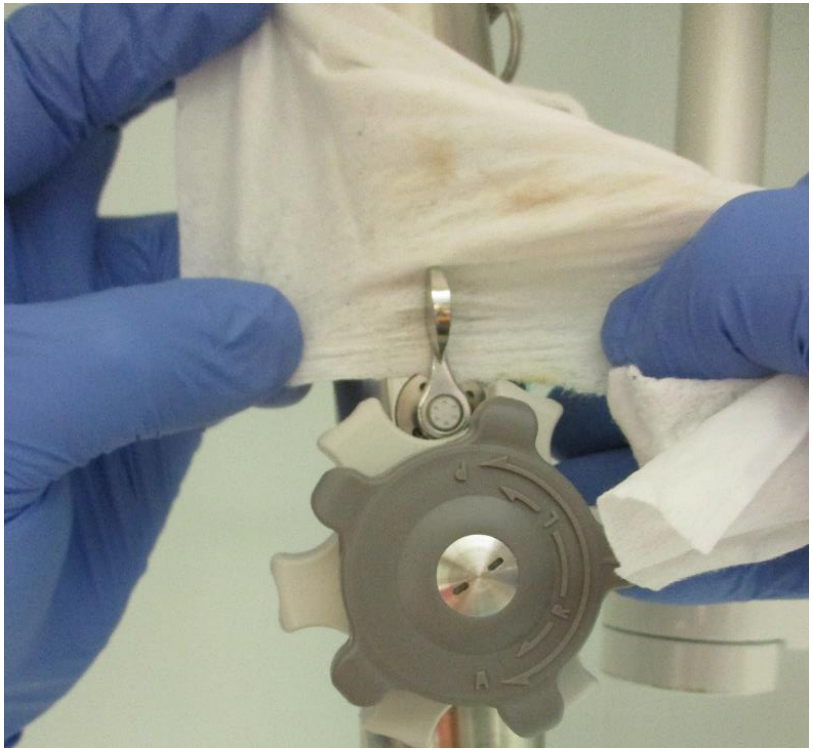
Intracavity probes are still a problem
TOE probes the prime example



- Essentially lumen-free gastroscopes, but can only be immersed up to the start of the probe handle
  - Not the angulation wheels or the plug socket
- The technology for fully immersible devices exists with endoscopes, but is not incorporated into TOE probes
  - Different manufacturers for each device type

The best available technology for TOE probe decontamination

Can get devices that enclose the angulation wheels and adapt washer-disinfectors so that only the insertion tube gets a validated decontamination – but this just addresses the easy bits



Incubator decontamination – 1980s

- Incubator contaminated with *P aeruginosa* culture in 15 places, unknown to me
- I then spent 20 minutes doing a thorough decontamination of the incubator with a cloth and bucket of hypochlorite/detergent.
- The inoculated areas then swabbed
- Of those 15 contaminated areas
  - 5 were clear
  - 2 showed slight growth
  - 8 showed heavy growth

Staph capitis & incubators - 2019

Butin *et al. Antimicrobial Resistance and Infection Control* (2019) 8:157
https://doi.org/10.1186/s13756-019-0616-1

Background: The methicillin-resistant clone Staphylococcus capitis NRCS-A, involved in sepsis in neonatal intensive care units (NICUs) worldwide, is able to persist and spread in NICUs, suggesting the presence of reservoirs inside each setting.

- "…… in our before/after disinfection study, all of 16 incubators were colonized before disinfection and 10 (62%) incubators remained colonized with NRCS-A after the disinfection procedure"

The reality of incubator decontamination

Crowded, little worktop space, one sink/drainer, impossible to have a defined dirty-to-clean flow

Not just incubators

- Lots of other problematic items throughout healthcare – such as pulse oximeters (see photo), BP cuffs, physio equipment, thermostat knobs on splint pans, seating in showers, mattresses, pillows, toys, clippers handles, blood glucose monitors, hoists, baby scale hand contact areas, EBM kit, bodies of tympanic thermometers, doppler probes, ultrasound keypads/rollerballs, IT tablets, IT mice, burns hydrotherapy baths, supports for single use bedpans, theatre gel limb supports, commodes, over-bed tables, wheelchairs, ice machines, calculators, laryngoscope bodies, privacy screens, patient trollies …..

Analysis of the problem

- Items are designed for function
  - Decontamination sometimes an afterthought, sometimes hardly considered at all
- The regulatory requirement for effective decontamination is weak
  - Often just a list of compatible agents and/or processes, but no verification of effective decontamination
- The drivers for increased amenability to decontamination would be either regulatory or customer-driven
  - Very often IPC is not a decisive part of device choice
  - This is an international market. If we have higher standards in the UK, that is insufficient to influence device design globally.

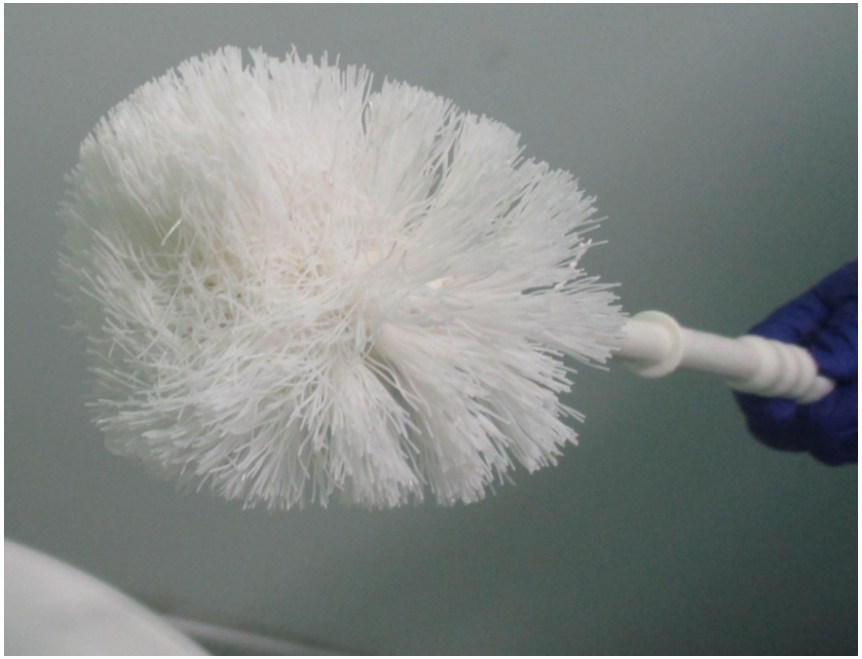
Deep cleans, including terminal cleans

- These are a vital component of the wider applications of decontamination
  - Cleaning, disinfection, discard …..
- There is no good definition of a “deep clean”, nor would this be practically helpful
  - Each deep clean would have its own specific requirements
  - This is more target-oriented than tick-box
- One of the main difficulties is that it should involve different staff groups working in coordination
  - Easy for things to get left out

Deep cleans

- Different staff groups will address different items
  - Floors, bathroom fittings, bedside lockers, pulse oximeters, BP cuffs, monitors, leads, privacy curtain change, mattress covers, dynamic bed mattresses, wheeled drawers sets, disposal of unused single use items ….
- This involves coordination of all these different staff groups
  - Such that each is involved when they should be
  - Such that no items are missed out

In a room deep cleaned after a patient with multi-drug resistant Gram negative bacillus infection



Multi-drug resistant Gram-negative bacilli (MDRGNB) – a significant part of the future

- A supremely adaptable and horrendously resistant group of bacteria
  - Resistance developing/increasing with time
- As with other microbes, international travel is no barrier
  - Whilst we can control antibiotic use locally, we get what the whole world offers
- They live inside us and in wet environments that we contribute to
  - Such as drainage systems

A WASTE-TRAP-STERILISING METHOD

J. KOHN
Queen Mary's Hospital, Roehampton, London S.W.15

THE LANCET, SEPTEMBER 12, 1970

… examination from various sites on the effluent side of a hospital plumbing system commonly reveals the presence of pathogenic microorganisms. Sink waste-traps in particular act as reservoirs of …. the gram-negative group of pathogens……. making their way from the trap of the basin to the hands of a person washing under running water is easily explained by backsplash …. demonstrated experimentally and under ward conditions using a marker organism.

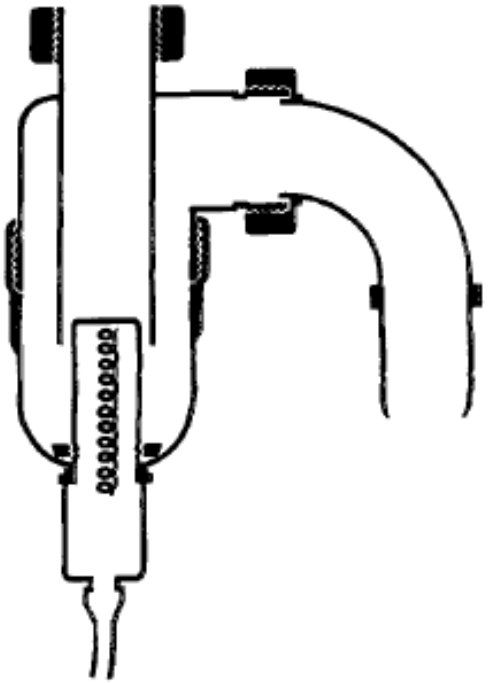


Fig. 2—Diagram of waste-trap unit with cylindrical electric heating element.

MDRGNB in drains

- MDRGNB derived from patients will take up residence as one of the inhabitants of the patches of biofilm (microbial communities in a slime layer attached to a surface) throughout a hospital's drainage system
- All arms of a drainage systems are interlinked – sections from basins, showers, toilets etc.
- Bacteria will migrate between biofilm patches
- You may be able to remove or kill a patch of biofilm at one point, but re-colonisation will occur from elsewhere in the system

MDRGNB and drains

- If all drain contamination is on a one-way path away from the clinical environment, no problem

Gratitude for observation & image to Dr Mike Weinbren

Showers also a risk

- Shower drains block and water pools in shower tray
- Reflux from drains
- Patients have their feet in dilute drain water
- Particular problem in haematology due to lost hair blocking shower drains + highly susceptible patients

- Breathnach et al. (2012) *Multidrug-resistant Pseudomonas aeruginosa outbreaks in two hospitals: association with contaminated hospital waste-water systems*. Journal of Hospital Infection 82; 19-24
- "Extensive environmental sampling in each outbreak yielded MDR-P only from the waste-water systems. ……. faulty sink, shower and toilet design, clean items stored near sluices, and frequent blockages and leaks from waste pipes. ……. Control measures included replacing sinks and toilets with easier-to-clean models less prone to splashback, educating staff to reduce blockages and inappropriate storage, reviewing cleaning protocols, and reducing shower flow rates to reduce flooding. **These measures were followed by significant reductions in cases**."

Water as friend or water as foe?

Control of endemic multidrug-resistant Gram-negative bacteria after removal of sinks and implementing a new water-safe policy in an intensive care unit. Shaw E et al. Journal of Hospital Infection 98 (2018) 275-281

- *"The implementation of a new water-safe policy, which included the **removal of sinks** from all patient rooms, successfully improved the control of MDR-GNB spread in an ICU with endemic infection. Our results support the contribution of sink use with the incidence of MDR-GNB in endemic environments."*

Reduced rate of intensive care unit acquired gram-negative bacilli after removal of sinks and introduction of 'water-free' patient care. Hopman J et al. Antimicrobial Resistance and Infection Control (2017) 6:59

- *"**Removal of sinks** from patient rooms and introduction of a method of **'water-free' patient care** is associated with a significant reduction of patient colonization with GNB, especially in patients with a longer ICU length of stay."*

Past, present & future - summary

- Infection prevention will not diminish in importance
- The challenge increases
  - Sicker, more invaded, more compromised patients
  - Antimicrobial resistance progressively more challenging
- Decontamination of medical devices and the environment remains problematic
- Most of the easy problems have been addressed
- The future will require highly detailed approaches that can be combined with the practicalities of high technology healthcare.

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The Infection Prevention Society is an independent charity with a 2,000 strong member network. Our vision is that no person is harmed by a preventable infection. We strive to fulfil our vision by informing, promoting and sustaining expert infection prevention policy and practice where care is delivered at local, national, and international level.

Keep your skills and knowledge up to date

Regulators of health and social care professionals, e.g. the NMC and GMC require that practitioners have the knowledge and skills for safe and effective practice when working without direct supervision and to recognise and work within the limits of competence.

www.webbertraining.com/schedulep1.php

October 7, 2021	**INFECTION CONTROL AND PREVENTION IN LONG-TERM CARE FACILITIES AND HEALTHCARE LAUNDRY** Speaker: **John Scherberger**, Healthcare Risk Mitigation, Spartanburg, SC
October 14, 2021	**COMMON FEATURES OF WATERBORNE PATHOGENS IN HEALTHCARE FACILITIES: WHY ARE THEY SO CHALLENGING?** Speaker: **Prof. Joseph O. Falkinham, III**, Department of Biological Sciences, Virginia Tech
October 20, 2021	*(FREE Teleclass)* **CLEAN HOSPITALS DAY 2021: WHY ENVIRONMENTAL HYGIENE IS MORE IMPORTANT THAN EVER** Speaker: **Prof. Didier Pittet**, University of Geneva Hospitals
October 28, 2021	*(FREE Teleclass)* **HAND HYGIENE RELOADED** Speaker: **Prof. Hugo Sax**, HumanLabZ, Zurich

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