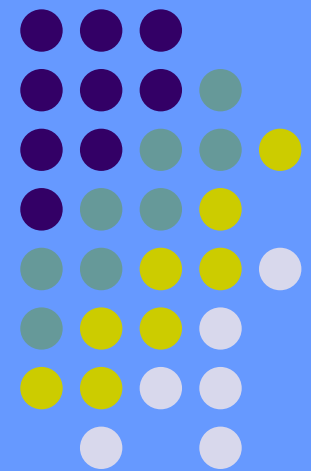


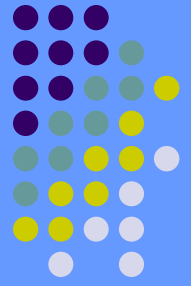
BASIC CONCEPTS OF INFECTION CONTROL

Water and Health

International Federation of
Infection Control

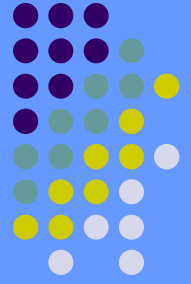


Background



- Water is required for
 - Drinking
 - Hygiene
 - Health related processes
 - Generating energy





Background



- Unclean water leads to ill health, outbreaks of infectious disease and healthcare-associated infections
- Water contaminated by microbes or chemicals affect large populations; the burden of disease is usually carried by children
- The integrity of systems used to collect, transport, store and distribute water is essential

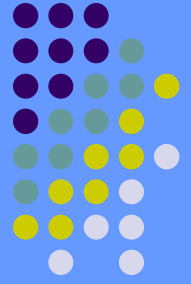


Sources of Water

- Urban areas
 - Natural sources
 - Stored and distributed via pipes or a grid
- Rural areas
 - Directly from lakes, rivers
 - Water butts collecting rain water
 - Wells, bore-hole tapping underground water



Uses of Water



- ***Domestic***

- Drinking
- Washing & laundry
- Sanitation
- Cooking



- ***Healthcare***

- Hand hygiene
- Processing equipment
- Dialysis
- Medications
- Physical therapy
- Operating theatres
- Laser equipment
- Energy source – steam
- Kitchen, laundry
- Sanitation





Domestic Use

- WHO definition of domestic water
 - *water used for all usual domestic purposes including consumption, bathing and food preparation*
- Minimum requirement – Fifteen (15) litre per capita per day
 - 5 litre per day recommended for drinking, cooking and sanitation



Health Care Facilities



- A clean water supply is fundamental, without which the following may occur:
 - Non-compliance with hand hygiene
 - Inadequate support from sterile services, especially autoclaves
 - Essential function failure such as operating theatres, endoscopy units, laundry and kitchens
 - Risk of contamination (sewerage and chemicals) of water pipes



Diseases Associated With Water

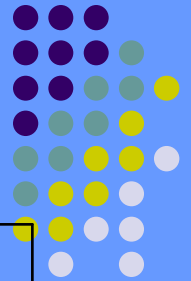


Four categories

- Water-borne
 - Disease associated with consumption of contaminated water
- Water-washed
 - Disease caused by inadequate volume for personal hygiene
- Water-based
 - Disease where an intermediate aquatic host is required
- Water-related vector
 - Disease spread through insect vectors associated with water



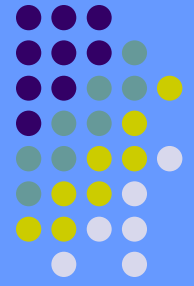
Water Related Diseases



	Community	Healthcare facility
Water borne	Diarrhoeal disease	Diarrhoeal disease
	Hepatitis A	Legionnaire's disease
	Typhoid	Typhoid
	Cholera	Cholera
Water washed	Diarrhoeal disease	Impetigo
	Trachoma	Group A streptococcal infection
Water based	Schistosomiasis	
	Guinea worm	
Water related vector	Malaria	Malaria
	Dengue	Dengue
	Yellow Fever	



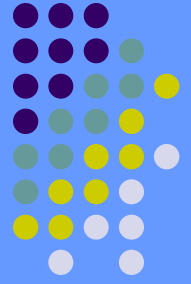
Rendering Water Safe - Community



- Boiling
 - Water temperature 100°C x 5 to 10 min - kills all pathogens
- Heating
 - Water temperature 75°C kills vegetative forms of bacteria, not spores



Rendering Water Safe - Community



- Designated person responsible for distributing water
 - Wash hands before decanting water
 - Keep water in a covered container until cool
 - Use a long clean dry ladle to take out water
 - DO NOT put your hand in the clean water container
 - Do not use the clean water container for any other purpose



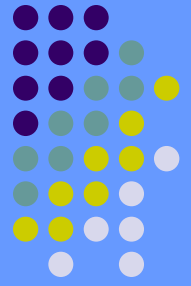
Rendering Water Safe - Chlorination



- Widely used
- Recommendations
 - Potable water - 0.5 ppm chlorine
 - Add chlorine to water storage tank
 - Keep river water unused for 1 hour
 - Keep borehole or well water unused for 30 min
 - Hydrotherapy pools - 15 ppm available chlorine
 - Whirlpools and spas - 2-5 ppm available chlorine



Rendering Water Safe – Healthcare Facilities



Potable water

- Drinking water - contains no more than 500 cfu/ml
- Storage tanks – need to prevent Legionnaire’s disease
 - Adequate storage of water to meet the needs of the hospital for 24 hours
 - Minimum heat gain - Tanks should be well insulated
 - Temperatures of 20°C or lower maintained
 - Clean regularly - emptied and remove debris, flushed through with water containing >2mg/l (2 ppm) chlorine
 - After water filled, the chlorine concentration 1-2mg/l chlorine at delivery point



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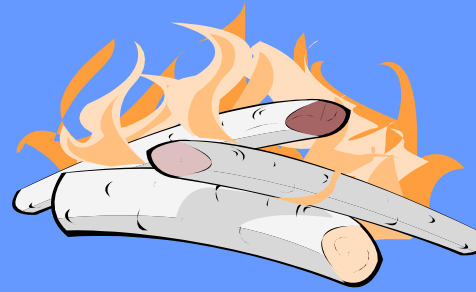
Rendering Water Safe – Healthcare Facilities



- End point hot water delivered at 55°C with a circulating temperature of 60°C
- All hot water taps clearly labelled
- Cold water temperatures less than 20°C after running for 2 minutes
- Rubber washers replaced with plastic ones
- Shower heads cleaned regularly



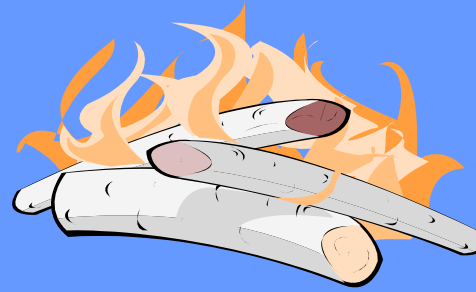
Heat Application



- Washing temperatures up to 80°C adequate to remove blood-borne viruses and vegetative bacteria only
- Laundry: temperature of 85°C or more for all linen
 - Theatre linen will require autoclaving



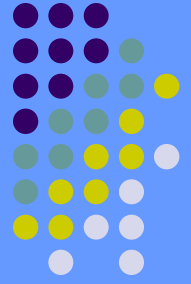
Heat Application



- Kitchen utensils and crockery: wash at 70°C and store dry
- Non clinical equipment: wash so that surfaces appear clean
 - Store inverted to dry



Filtration



- Filtration is designed to remove particles of varying structure and sizes
 - Used for removing sediment - expensive
 - Recommended where heat or chemical disinfection is inappropriate

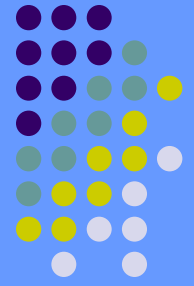


Filtration



- Dialysis units
 - Water supply fitted with an ultra filter or pyrogen filter
 - with a pore size to remove particles >1 kilodalton
- Endoscopic equipment
 - Rinse disinfected endoscopes with water filtered through 0.1-0.2 mm filter



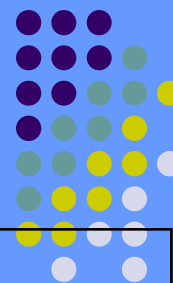


Other Methods

- Ozone
 - added to laundry to bleach and remove vegetative forms
- De-ionisation
 - used in specialised fluid production in pharmacy and radiotherapy
- De-mineralization
 - a complex process used in surgery
 - for laser equipment

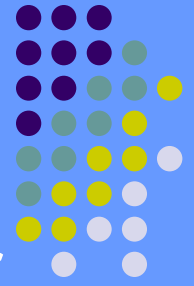


Alternative Choices



Use	Alternative choice
Sterile services	Steam generation by boiling water. Feed autoclaves and instruments washing area. Run water from clean to dirty areas
Washing equipment	Hot water (70°C)
Hand washing	Cold running water or alcohol rub. Do not use standing water in basins for multiple hands
Drinking water	Boiled water stored in clean closed containers; allow a dedicated person to decant
General use	Hot water from large tanks heated to 60°C
Laundry	Wash in available water, use small quantities of bleach, dry in sun
Bedpans/ urinals	Clean thoroughly and lay inverted in sun





Summary – Domestic Use

Collection: from source into a clean container or directly delivered to residence

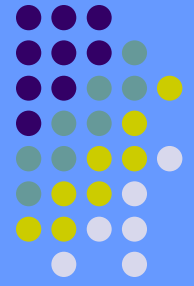
Transportation: large and small containers cleaned regularly and decontaminated

Storage: in containers with well fitted lids and a tap

Distribution: either via pipes or a clean container

Effluent: into a municipal system or away from the source water supply





Summary - Healthcare Use

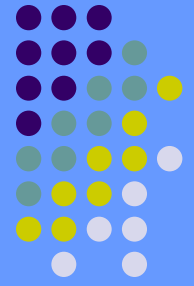
Piped water: well maintained pipes, no leaks or cracks, away from sewerage pipes

Storage: large clean tanks maintained regularly

Distribution: piped system with clearly labelled hot and cold water, multi-purpose use open containers are unacceptable

Effluent: into a municipal system. If not, then treated with chlorine before discharge

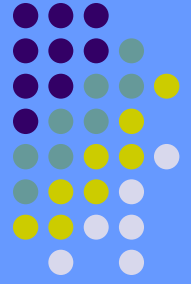




Key Points

- Water is required for drinking, hygiene, health related processes and generating energy
- Unclean water leads to ill health, infectious disease in the community and healthcare-associated infections in healthcare facilities
- The integrity of systems used to collect, transport, store and distribute water is essential





Key Points

- Render water safe by boiling water for 2-5 minutes or filter/add chlorine
- Water used in healthcare facilities may require distillation, removing chemical impurities or sterilizing



References and Further Reading



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