# **HTM 04-01: Safe Water in Healthcare Premises – FRCPath Notes**

## **1. Purpose & Scope**

* Water systems in healthcare = reservoir for **opportunistic pathogens**.
* **Key organisms**: *Legionella spp.*, *Pseudomonas aeruginosa*, *Stenotrophomonas maltophilia*, *Burkholderia cepacia*, atypical mycobacteria.
* Failures → outbreaks, morbidity, mortality, litigation.
* HTM 04-01 (2016) replaces 2006 edition + 2013 *Pseudomonas* addendum.
* Structure:
  + **Part A** – Design, installation, commissioning.
  + **Part B** – Operational management.
  + **Part C** – Pseudomonas in augmented care.
  + **Part D** – Thermostatic Mixing Valves (TMVs).

## **2. Governance & Regulation**

* **Health & Social Care Act 2008 Regs (2014)**:
  + Reg 12(2)(h) – infection prevention.
  + Reg 15 – safe environment.
* **CQC** enforces compliance.
* **HSE ACOP L8** + HSG274: legal Legionella framework.
* **Water Supply (Water Fittings) Regs 1999** + **Water Quality Regs 2000/2009** apply.

## **3. Water Safety Group (WSG) & Plan (WSP)**

* **WSG** = multidisciplinary group responsible for safe water.
* Reports to CEO/Board — accountability cannot be delegated.
* **Membership**:
  + Designated Person (senior manager).
  + Responsible Person (Water) – estates.
  + Authorised Engineer (Water) – independent advisor.
  + IPC nurse + consultant microbiologist.
  + Clinical reps – ICU, renal, NICU, burns, oncology.
  + Estates engineers, water hygiene technicians.
  + Health & Safety advisor.
  + CCDC/Public Health for outbreaks.
  + Risk management/procurement projects as needed.
* **Responsibilities**:
  + Maintain **risk register**.
  + Approve remedial actions, derogations.
  + Oversee staff training, competence, records.
  + Audit sampling & compliance.
  + If **non-conformity** (for example, positive microbiology, temperature failure, or poor cleaning) is found:
    - Log event on the risk register.
    - Immediate risk assessment by Responsible Person + IPC/microbiologist.
    - Implement interim controls (e.g. isolate outlet, fit POU filter, provide sterile water).
    - Commission remedial works or cleaning/disinfection.
    - Escalate to senior management/Board if significant risk.
    - Resample and monitor effectiveness of actions.
    - Document all steps and close out when resolved.
* **WSP**\*\* = living risk-management document (hazards, controls, monitoring, escalation).

## **4. Part A – Design, Installation & Commissioning**

* **Design principles**:
  + Avoid stagnation: no dead-legs, redundant outlets, oversized tanks.
  + Adequate turnover + resilience (emergency storage/alternative supply).
  + Use BS 6920–approved materials; avoid plastics/rubbers that leach nutrients.
* **Temperature regime**: cold <20 °C; hot stored ≥60 °C; outlets ≥55 °C within 1 min.
* **Treatment**: chlorine dioxide, copper–silver ionisation, ozone, UV.
* **POU filters**: interim safeguard, not long-term; must be changed as per manufacturer.
* **TMVs**: must balance scald prevention with infection control risk.
* **Hygienic installation**: clean storage, prevent contamination during works.
* **Training**: estates/cleaning staff require water hygiene training.

## **5. Part B – Operational Management**

### **Legionella**

* **Ecology**: thrives 20–45 °C, biofilms, poor flow, protozoa.
* **Transmission**: aerosols (showers, taps, toilets), aspiration, ice.
* **Risk groups**: >50, smokers, chronic disease, immunosuppressed.

#### **Action levels (cfu/L)**

* <100: acceptable.
* 100–1,000: investigate, resample, check TMVs/hoses.
* 1,000–10,000: urgent remedial actions, fit POU filters, resample 2–7 d.
* 10,000: system-wide contamination → full disinfection, isolation.

#### **Sampling strategy**

* **Volumes**: typically 1 L collected per outlet for Legionella culture.
* **Locations**: sentinel outlets (nearest/furthest on each loop), calorifier flow and return, cold water storage tanks, plus risk-based additional outlets.
* **Approach**: samples taken without flushing first (to capture colonisation), followed by post-flush samples in some situations to assess systemic vs outlet colonisation.

### **Pseudomonas aeruginosa**

* **Ecology**: thrives in outlets, nutrient-poor water, biofilms.
* **Transmission**: contact (washing, wounds, mucosa), aerosols, indirect via staff/equipment.

#### **Action levels (cfu/100 mL)**

* Not detected: no action; resample at 6 months.
* 1–10: repeat samples, risk assess; persistent → survey outlet/system.
* 10: systemic contamination → clean/remove fittings, engineering survey.

#### **Sampling strategy**

* **Volumes**: 100 mL per sample, cultured for *Pseudomonas*.
* **Method**: pre-flush samples collected immediately after turning on the tap (highest risk, reflects outlet contamination), and post-flush samples after water has run for 2 minutes (reflects systemic contamination).
* **High-risk areas**: all outlets in augmented care (patient contact, handwashing, equipment filling).

**Interpretation**:

* High pre-flush, low post-flush = outlet problem.
* High both pre & post-flush = systemic.
* Use schematics to map spread.

### **Operational controls**

* Flush unused outlets daily.
* Quarterly clean/disinfect showers; more if indicated.
* Remove redundant outlets.
* Monitor temps & flow.
* Documentation of all checks essential.

## **6. Part C – Augmented Care**

* **High-risk groups**: immunosuppressed, ICU/NICU, renal, burns, CF.
* **Controls**:
  + Direct water = *Pseudomonas*-negative, POU-filtered, or sterile.
  + No aerators/flow straighteners.
  + Taps cleaned before basins; separate cloths.
  + Basins = handwashing only.
  + Soap/hand rub dispensers = cartridge only, positioned away from taps.
  + Prohibited: ice machines, water features, chilled dispensers.
  + Equipment: single-use or rinsed in safe water.
  + Unused taps flushed daily (≥1 min).

## **7. Part D – Thermostatic Mixing Valves (TMVs)**

* **Purpose**: prevent scalding — NHS “never event”.
* **Risk**: TMVs can encourage microbial colonisation (biofilm at warm temps).
* **Best practice**:
  + **Integral TMVs** preferred (always flush cold through).
  + Must be selected, installed, and maintained per D08 performance specification.
  + **Commissioning tests**:
    - Temperature stability across flow rates.
    - Fail-safe shut-off if cold water supply fails.
    - Reproducibility of set temp.
  + **Maintenance**:
    - Regular inspection, cleaning, descaling.
    - Remove/replace if failing or unnecessary.
  + TMV policy must be risk-assessed by WSG (e.g. whether required in adult general care vs high-risk groups).
* **Balance of risks**:
  + *Without TMV*: scald risk (esp. children, elderly, disabled).
  + *With TMV*: ↑ risk of colonisation if poorly maintained.

## **8. Testing & Microbiological Standards**

* **Legionella**: BS 7592; sentinel outlets, calorifiers, tanks; usually quarterly.
* **Pseudomonas**: pre- & post-flush samples; last 2 m of pipework highest risk.
* **Frequency**: risk-based; mandatory in augmented care at commissioning and regularly thereafter; repeat after alterations/outbreaks.
* **Labs**: UKAS-accredited (ISO 17025).
* **Detection**: Legionella ≤100 cfu/L; Pseudomonas presence/absence or counts.

## **9. Outbreak Management**

* ≥2 linked cases = outbreak.
* Proper Officer (CCDC) declares outbreak; outbreak control team convened.
* Notify UKHSA HPT.
* Estates, IPC, microbiology investigate; system disinfection if implicated.
* **RIDDOR**: Legionellosis in exposed staff must be reported.

## **10. Training**

* Mandatory **water hygiene training** for estates/domestics.
* Includes: governance, pathogens, contamination routes, personal hygiene, tools/equipment use, local policies.
* Refresher if standards fall.

## **11. Other Considerations**

* **Stenotrophomonas maltophilia**: heat-sensitive; isolated from taps, showers, pools, disinfectants, haemodialysers, bronchoscopes.
* **Burkholderia cepacia, NTM**: also implicated; follow *Pseudomonas* sampling if suspected.
* **Security**: restrict access to plant; malicious contamination covered by NHS Protect guidance.

## **12. Exam Key Phrases**

* “WSGs and WSPs are central to HTM 04-01.”
* “Legionella controlled by temp regime; *Pseudomonas* requires stricter outlet-level measures.”
* “Action levels: Legionella 100, 1,000, 10,000 cfu/L; Pseudomonas >10 cfu/100 mL = remedial action.”
* “In augmented care, only water that is *Pseudomonas*-negative, filtered, or sterile can contact patients.”
* “Basins are for handwashing only; drains are invariably colonised.”
* “TMVs: balance scald prevention with colonisation risk; integral TMVs preferred.”