

Infection Control

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EXAM-DAY SUMMARY

everything on this page → detail in §§ overleaf

GOVERNANCE → §1

- Source: BDA advice sheet **A12**; every practice needs a **written**, readily available policy
- Medical history at first visit + updated; questionnaire + direct questioning
- History misses asymptomatic carriers → **universal precautions, same procedures for all**
- Inadequate cross-infection control = serious professional misconduct; HIV/hepatitis carriers treated routinely in primary care
- New staff trained **before** working: transmission · decontamination policy · PPE · what to do after injury

SURGERY DESIGN → §2

- Simple, uncluttered; two areas — operator and nurse — each with a basin, **elbow- or foot-operated taps**, liquid soap
- Clean and dirty zones clearly defined; unit surfaces impervious, cleanable, disinfectant-resistant
- Decontaminate: dental unit, chair, light cure, light, spittoon, X-ray machine
- Blood spill: towels + **10,000 ppm hypochlorite** or dichloroisocyanurate granules, ≥ 5 min, ventilate; **X** alcohol (fixes protein)

DECONTAMINATION → §3

- **Pre-sterilization cleaning → sterilization → storage**; away from the surgery where possible
- Inspect after cleaning → debris → re-clean; manual sink water < **45 °C** (protein fixation)
- Hand = least efficient (household gloves + eyewear; brush autoclaved each session)
- Ultrasonic: **detergent not disinfectant**; don't interrupt the cycle. Washer/disinfector most efficient — never replaces sterilization
- W/D cycle: flush <45 °C → wash → rinse → thermal disinfection **80 °C/2 min or 90 °C/1 min** → dry

AUTOCLAVES → §4

- Dental instruments: **134–137 °C for 3 minutes**; free steam circulation, no overloading
- N-type: air displaced by steam · 121 °C, 15 PSI, 15 min · solid unwrapped only
- B-type: vacuum · 134–137 °C, 30 PSI, 3 min · wrapped and hollow loads; expensive, bulky, maintenance
- S-type: specific load types. Service annually; drain chamber and leave open overnight

MONITORING → §4

- Physical (temp, time, pressure) **daily** · chemical (colour, HELIX/ Bowie-Dick) **each load** · biological spores **weekly**
- **A failed physical reading overrides a passed chemical indicator** → repeat cycle; second failure → engineer

HANDPIECES • TEETH → §5

- Handpiece cleaned and autoclaved after each patient (N or B); bur in → detergent outside (**never immerse in disinfectant**) → remove bur → lubricate → sterilize
- Impressions: rinse under running water, follow manufacturer, tell the lab
- Amalgam-filled teeth: **X** sharps container (must not be incinerated) → with waste amalgam
- For teaching: consent recorded; amalgam → 10% formalin 2 weeks · non-filled → 10% NaOCl

CLINICAL WASTE → §6

- Sacks ≤ **¾ full**, air squeezed out, tied at the neck not knotted
- Sharps in UN-approved puncture-proof containers, discard at ≤ **¾ full**; LA cartridges always via sharps
- Consignment notes kept 3 years; transfer note both parties, one note covers 1 year, copy kept 2 years
- Registered carrier; high-temperature incineration; > 500 kg hazardous waste/year → register premises annually
- Colours: purple cytotoxic · red anatomical · yellow clinical · blue medicinal · orange infectious · white+skull amalgam · white gypsum · yellow/black offensive · black municipal

HAND HYGIENE → §7

- General hand care · jewellery removal · washing and drying · gloves
- Social: plain/antimicrobial soap, 10–15 s, non-clinical
- Hygienic (WHO 6-step): antimicrobial soap, **15–30 s**, clinical
- Surgical: CHX 4% or povidone iodine 7.5%, 2–3 min, before surgery

WATER LINES → §8

- Self-contained bottled system, freshly distilled water
- Type A air gap from mains; anti-retraction valve highly important
- *Legionella* ≤ **100–200 cfu/ml**; untreated systems > 1,000,000 cfu/ml

IMMUNISATION • EPP • CJD → §9

- Hep B vaccination mandatory with documented response; anti-HBs at 2–4 months, **> 100 mIU/ml = protected**, booster at 5 years
- Non-responder < 10 mIU/ml → investigate for infection, then repeat course
- Risk if non-immunised: HBV **30%** · HCV **3%** · HIV **0.3%**
- EPP with HBsAg+ allowed if HBeAg negative and viral load < 1000 genome/ml, retested annually
- CJD: prions, hard to destroy, mostly via endodontic files and reamers

§1 Governance and universal precautions

Source for the whole lecture: the British Dental Association (BDA) advice sheet **A12, Infection Control in Dentistry**.

- **Written policy:** every practice **must** have a written infection control policy · kept **readily available** so staff can refer to it when necessary
- **Medical history:** obtained for **all** patients at the **first visit** · updated regularly · questionnaire + direct questioning and discussion between dentist and patient
- **Environment:** discussions in a setting that permits disclosure of **sensitive personal information** → the information is retained as part of the patient's dental records
- **Why history is not enough:** history and examination **may not identify asymptomatic carriers** → ★**universal precautions** → **the same infection control procedures for all patients**

KEY POINTS

The whole discipline rests on one inference: you cannot tell who is infectious, so you treat everyone as if they were. Medical history informs care — it never selects the level of cross-infection control.

1.1 Duty of care and professional liability

- **Liability:** "failure to employ adequate methods of cross-infection control would almost certainly render a dentist liable to a charge of ★**serious professional misconduct**"
- **Duty to treat:** clinicians have a general obligation to provide care to those in need → extends to **infected patients**, who are offered the **same high standard of care** as any other patient
- **HIV and hepatitis carriers:** those with HIV who are otherwise well, and hepatitis virus carriers, **may be treated routinely in primary care**
 - if they subsequently develop AIDS → may be appropriate to refer for specialist advice and care
- **Patient questions:** never be too busy to answer them · all staff confident and competent to answer queries, or know who to refer to

1.2 Staff training

- **All new staff** trained in infection control **before** working in the practice · training must equip them to understand —
 - how infections are transmitted
 - the practice policy on decontamination and infection control
 - what personal protection is required and when to use it
 - what to do in the event of accidents or personal injury

★ EXAM PEARL

Two governance facts are near-guaranteed marks: the policy must be **written and accessible**, and inadequate cross-infection control is framed as **serious professional misconduct** — a GDC matter, not merely a clinical failing.

§2 Surgery design, zoning and surface decontamination

- **Design:** simple and uncluttered · **two distinct areas** — one for the operator, one for the dental nurse
 - each with a wash basin → ★**elbow- or foot-operated taps** + liquid soap dispensers
- **Operator's area:** turbines · three-in-one syringe · slow handpiece · bracket table · operating light
- **Nurse's area:** suction lines · perhaps the three-in-one syringe · curing light · all cabinetry containing dental materials · a designated area for clinical waste disposal and instrument decontamination
- **Zoning:** clean and dirty areas within the surgery **clearly defined** → a strict system of zoning aids and simplifies decontamination

2.1 Surfaces

- **Dental unit surfaces must be:** **impervious** · able to be cleaned and disinfected · **resistant to common disinfectants**
- **Areas to be decontaminated:** dental unit · dental chair · light cure · light · spittoon · X-ray machine

2.2 Blood spillage

- **Cover completely:** disposable towels treated with ★**10,000 ppm sodium hypochlorite**, or sodium dichloroisocyanurate granules
- **Solution:** made up fresh, or weekly, and stored in a **single-use container**

- **Contact time:** at least ★5 minutes before the towels are cleared · good ventilation essential
- ✗ **Alcohol:** never — it **fixes protein** to the surface

CAUTION

Alcohol on a blood spill and hot water on a dirty instrument fail the same way: both **fix protein**, welding contamination onto the surface. Hypochlorite for spills, water < 45 °C for instruments.

§3 Instrument decontamination — cleaning

- **Where:** where possible, instruments decontaminated **away from the surgery** — in a room containing the autoclave, ultrasonic bath, instrument washer, sinks, and a **separate hand wash basin**
- **Three stages:** ★pre-sterilization cleaning → sterilization → storage
- **Segregation:** a systematic approach ensures dirty instruments are kept apart from clean
- **Inspection:** after cleaning, every instrument is examined thoroughly → **residual debris** → **re-clean**

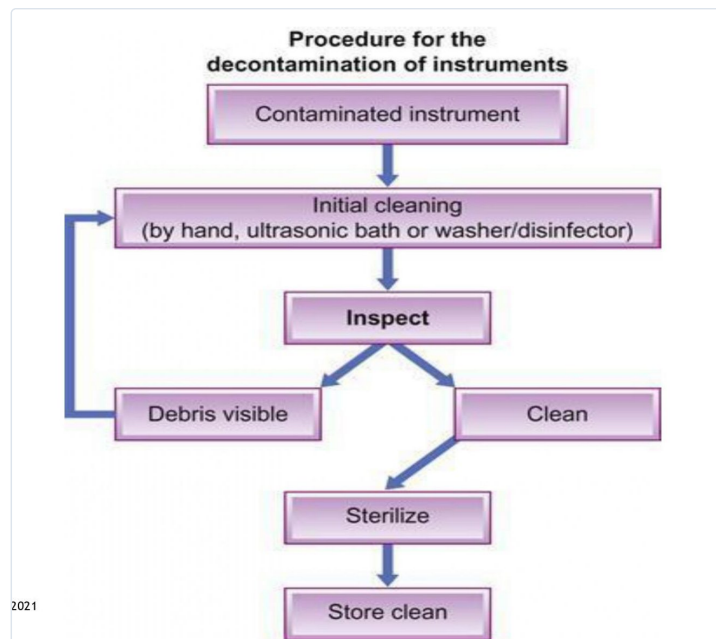


Fig. 1 — Contaminated instrument → initial cleaning (hand, ultrasonic bath or washer/disinfector) → inspect → debris visible loops back to cleaning; clean → sterilize → store clean.

3.1 The three cleaning methods

Table 1 — Pre-sterilization cleaning: hand vs ultrasonic vs washer/disinfector

	Hand cleaning	Ultrasonic bath	Washer/disinfector
Efficiency	Least efficient method	Preferred over hand	Most efficient at pre-sterilization cleaning
Why preferred	—	More efficient · minimum contact with contaminated instruments · testable	
Key rules	Sink pre-filled (half filled) with warm water + detergent , instruments fully immersed · long-handled kitchen-type brush · rinse under fresh water with the sharp end away from the body	Detergent, ★✗ not a disinfectant · cycle must not be interrupted to add instruments · liquid discarded at the end of each clinical session (sooner if heavily contaminated)	Manufacturer's instructions · ★✗ never a substitute for sterilization
PPE / upkeep	Thick waterproof household gloves + protective eyewear · brush cleaned, autoclaved and stored dry at the end of each clinical session	End of each day: emptied, cleaned, left dry · used and serviced per manufacturer	Serviced per manufacturer

- **Manual sink:** sufficient depth for instruments to be **fully covered with water** → minimises splashing
- **Water temperature:** ★< 45 °C → prevents **protein coagulation** and fixing of soil to the instrument
- **Why detergent, not disinfectant, in the ultrasonic:** disinfectant solutions alone **precipitate proteins** → makes them resistant to removal

- **Check first:** confirm with the manufacturer that instruments can withstand ultrasonic cleaning and automated processing



Fig. 2 — The three routes to a clean instrument: hand cleaning, ultrasonic bath, instrument washer/disinfector.

3.2 Washer/disinfector cycle

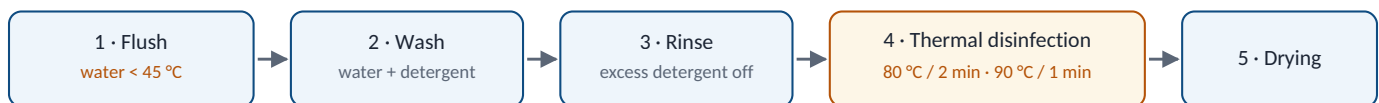


Diagram 1 — Washer/disinfector mode of action. The first flush is deliberately cold to avoid fixing protein; disinfection is thermal, not chemical.

★ EXAM PEARL

Thermal disinfection at 80 °C for 2 min is **disinfection, not sterilization**. The washer/disinfector is the best *cleaner* available and can never replace the autoclave — a favourite single-best-answer distractor.

§4 Sterilization and monitoring

- **Parameters:** for dental instruments and equipment, autoclaves should reach ★134–137 °C for three minutes
- **Loading:** instruments placed to allow **free circulation of steam** · the chamber **must not be overloaded**
- **Recording:** new autoclaves should have an **integral printer** → cycle parameters recorded for routine monitoring
- **Air removal defines the type:** displaced downwards by steam (**N-type**) · evacuated to a vacuum before steam enters (**class B**)

Table 2 — Autoclave types and cycle parameters

	B-type (vacuum)	N-type (non-vacuum)	S-type
Air removal	Air evacuated to create a vacuum before steam enters	Air passively displaced downwards by steam	—
Temperature	★134–137 °C (270 °F)	121 °C (250 °F)	Specially designed for specific load types
Pressure	30 PSI	15 PSI	
Holding time	★3 minutes	15 minutes	
Loads	Wrapped loads · hollow, air-retentive items	Solid, unwrapped instruments	As specified by the manufacturer
Downside	Expensive · bulky · needs maintenance	Cannot handle wrapped or hollow loads	—

★ EXAM PEARL

Note the deck's own tension: slide 27 sets **134–137 °C for 3 min** for dental instruments generally, while the comparison table gives the N-type as **121 °C for 15 min**. In UK practice benchtop N-type sterilizers also run a 134–137 °C / 3-minute cycle; 121 °C / 15 min is the classic laboratory-autoclave figure. Learn both pairs — and remember the real N vs B distinction is **air removal and therefore load type**, not temperature.

4.1 Monitoring

Table 3 — Sterilization monitoring

Type	What is checked	Frequency
Physical	Temperature, time and pressure	★ Daily
Chemical	Change in colour · HELIX (Bowie-Dick) test	★ At each load
Biological	Biological spores used to assess sterilization	★ Weekly

- **Physical readings win:** any reading outside its specified limits → cycle regarded as **unsatisfactory irrespective of the chemical indicator result** → repeat the cycle
 - second cycle unsatisfactory → **autoclave not used until rectified by an engineer**



Fig. 3 — HELIX / Bowie-Dick chemical indicator: blue before the cycle, uniformly dark after adequate steam penetration.

★ EXAM PEARL

A chemical indicator proves **steam reached the pack**, not that the load is sterile — which is why a failed physical reading overrides a passed colour change. (Strictly, the **Bowie-Dick** pack tests steam penetration into porous loads and the **helix** device tests hollow lumens; the lecture treats them as one.)

4.2 Autoclave maintenance

- **Servicing:** regularly serviced and maintained per manufacturer's recommendations · periodically inspected — ★ **usually annually**
- **End of each day:** residual water drained from the chamber by integral drainage device · high volume suction · a drain valve · and left **open to dry overnight**

§5 Handpieces, impressions and extracted teeth

5.1 Handpieces

- **Rule:** cleaned and **autoclaved after each patient** · pre-sterilization cleaning machines are recommended

1. **Leave the bur in place** during cleaning
2. **Clean the outside** with detergent and water — ★ **never clean or immerse the handpiece in disinfectant**
3. **Remove the bur**
4. **Lubricate** with pressurized oil, if recommended by the manufacturer
5. **Sterilize in an autoclave** — both N and B types are accepted
6. **Lubricate again after sterilization**, if recommended by the manufacturer

5.2 Impressions and appliances

- **Steps:** rinse under running water · follow the manufacturer's instructions · **inform the laboratory** about the decontamination steps you used

5.3 Extracted teeth

- **Amalgam-filled extracted teeth:** ★ **not in the sharps container** — amalgam **must not be incinerated** → disposed of with **waste amalgam** · waste agencies often supply special containers for them

- **Teaching / research:** amalgam-filled and non-filled teeth may be posted to universities, but the patient's **consent must be obtained first and recorded in the clinical records**
 - teeth must be **decontaminated and packaged securely** so the package cannot split in transit
 - some dental schools supply a container and disinfectant for decontamination, storage and transport
- **Decontamination for teaching:** amalgam-filled → ★**10% formalin for 2 weeks** · non-filled → ★**10% sodium hypochlorite**

CAUTION

The single fact most likely to be tested here: an amalgam-filled tooth is **mercury waste, not sharps waste**. Putting it in the sharps bin sends mercury to the incinerator.

§6 Clinical waste

- **Segregate** all practice waste into **clinical** and **non-clinical**
- **Clinical waste** = waste contaminated with **blood, saliva or other body fluids** that may prove hazardous to anyone coming into contact with it
- **Clinical waste sacks:** no more than ★**three-quarters full** · air **gently squeezed out** · labelled and **tied at the neck, not knotted**
- **Sharps** (needles, scalpel blades): sealed in **UN-type approved puncture-proof containers** · labelled · disposed of when no more than ★**two-thirds full**
- **Local anaesthetic cartridges:** partially discharged (hazardous) **or** fully discharged — **always** via the sharps container → container disposed of as **hazardous waste**
 - consignment notes completed and kept for ★**three years**

6.1 Collection and records

- **Carrier:** clinical waste collected only by a **registered waste carrier holding a certificate of registration**
- **Transfer note:** completed and signed by **both parties** at collection
 - repeated transfers of the same waste between the same parties → one note covers up to ★**one year** · copy kept for ★**two years**
- **Storage and final disposal:** clinical and sharps waste stored **securely** before collection → usually **high-temperature incineration**
- **Premises registration:** any clinic producing more than ★**500 kg hazardous waste per year** must register its premises **annually**

Table 4 — Waste segregation colour code

Colour	Stream	Classification
Purple	Cytotoxic / cytostatic	Hazardous
Red	Anatomical	Hazardous / non-hazardous
Yellow	Clinical / highly infectious	Hazardous
Blue	Medicinal	Non-hazardous
Orange	Clinical / infectious	Hazardous / non-hazardous
White (skull symbol)	Dental — amalgam	Toxic
White	Dental — gypsum	Non-hazardous
Yellow & black	Offensive	Non-hazardous
Black	Mixed municipal waste	Various

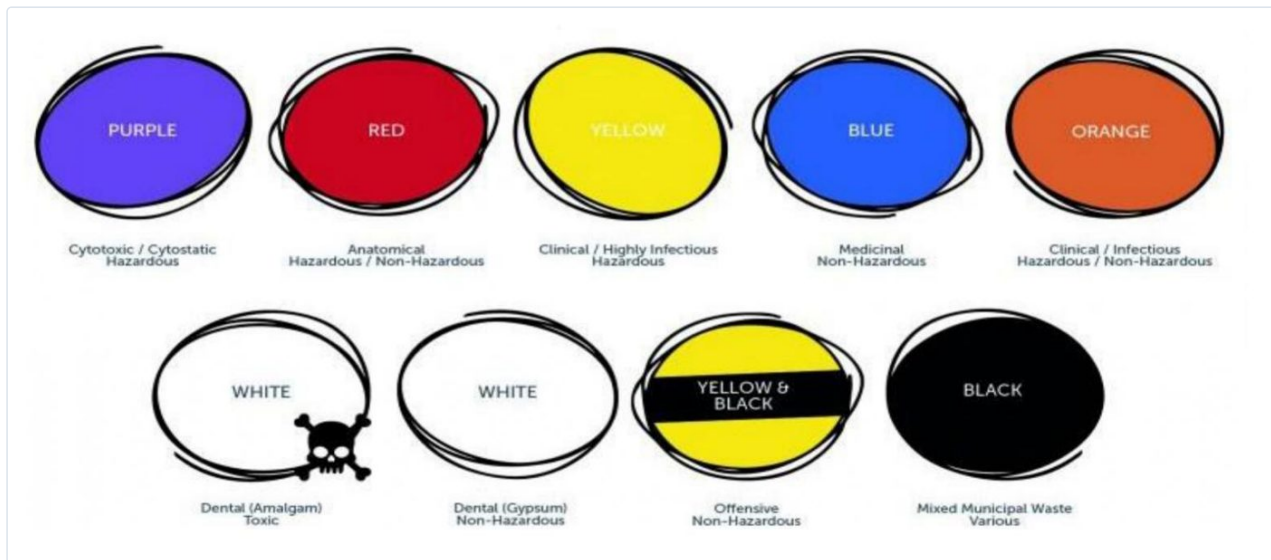


Fig. 4 — The waste colour code. Two whites: skull symbol = amalgam (toxic), plain = gypsum (non-hazardous).

§7 Hand hygiene

- **Hand hygiene includes:** general hand care · **jewellery removal** · hand washing and drying · wearing gloves

Table 5 — Types of hand washing

	Agent	Duration	When
Social	Plain or antimicrobial liquid soap	★10–15 s	Non-clinical activity
Hygienic (6-step technique)	Antimicrobial soap	★15–30 s	Clinical activity
Surgical	Chlorhexidine 4% or povidone iodine 7.5%	★2–3 min	Before surgery



Fig. 5 — WHO 6-step technique, used for the hygienic hand wash before clinical activity.

★ EXAM PEARL

Three agents, three durations, three settings — and the ladder is easy to remember because each step roughly doubles: seconds for social, half a minute for clinical, minutes for surgical.

§8 Dental unit water lines (DUWLs)

- **Supply:** preferable to use **self-contained water supplies** (bottled water system) · water should be **freshly distilled**

- **Backflow protection:** a **Type A air gap** separates the DUWLs from the mains supply · an **anti-retraction valve is highly important**
- **Microbial limits:** *Legionella* colony count should not exceed ★ **100–200 cfu/ml**
- **Untreated systems:** may contain more than ★ **1,000,000 cfu/ml** — a four-log gap between a managed and an unmanaged line

§9 Immunisation, health clearance and CJD

9.1 Hepatitis B immunisation

- **Requirement:** all those involved in clinical procedures **must be vaccinated against hepatitis B** · clinicians and staff must hold **documentary evidence** of immunisation **and** of their checked response
- **Testing:** anti-HBs measured ★ **2–4 months after completion** of the course
- **Protective level:** UK experts — anti-HBs ★ **> 100 mIU/ml** provides protection
- **Booster:** a single booster dose ★ **five years** after completion of the primary course
 - pre- and post-testing at the time of the booster **not required** if the individual responded to the primary course
- **Inoculation injury before the course is complete:** follow-up action essential — boosters **and** tests for hepatitis B markers

9.2 Non-responders (anti-HBs < 10 mIU/ml)

- **Two reasons:** true non-responders · or they **carry the virus** — either way they **remain susceptible to infection**
- **Action:** investigate for markers of hepatitis B infection **before** giving boosters → no infection → **repeat the course**, aiming for anti-HBs of at least 100 mIU/ml

Table 6 — Anti-HBs levels and occupational transmission risk

Anti-HBs	Interpretation
> 100 mIU/ml	Protected
< 10 mIU/ml	Non-responder → investigate for infection, then repeat course

- **Risk after exposure in a non-immunised individual:** hepatitis B ★ **30%** · hepatitis C ★ **3%** · HIV ★ **0.3%**

★ EXAM PEARL

30 · 3 · 0.3 — the ten-fold ladder from hepatitis B to hepatitis C to HIV is the most reliably examined number set in the whole lecture, and the reason hepatitis B vaccination is mandatory while the other two are managed by precautions alone.

9.3 Additional health clearance for exposure-prone procedures (EPP)

Table 7 — Health clearance for exposure-prone procedures

Virus	Clearance to perform EPP	If not met
Hepatitis B	EPP permitted even if HBsAg positive , provided: HBeAg negative · viral load ★ < 1000 genome/ml · viral load retested annually	HBeAg positive or viral load > 1000 → no EPP
Hepatitis C	Hepatitis C antibody negative · if antibody positive, hepatitis C RNA must be negative	Seek advice from the local occupational health service
HIV	HIV antibody negative	Seek advice from the local occupational health service

9.4 Creutzfeldt-Jakob disease (CJD)

- **Agent: prions** · much more difficult to destroy than conventional micro-organisms
- **Dental route:** mostly transmitted via **endodontic files and reamers**

CAUTION

Prions survive routine autoclaving, so the dental control is **single-use** endodontic files and reamers rather than reprocessing — no cycle in the surgery can be relied on to destroy them.