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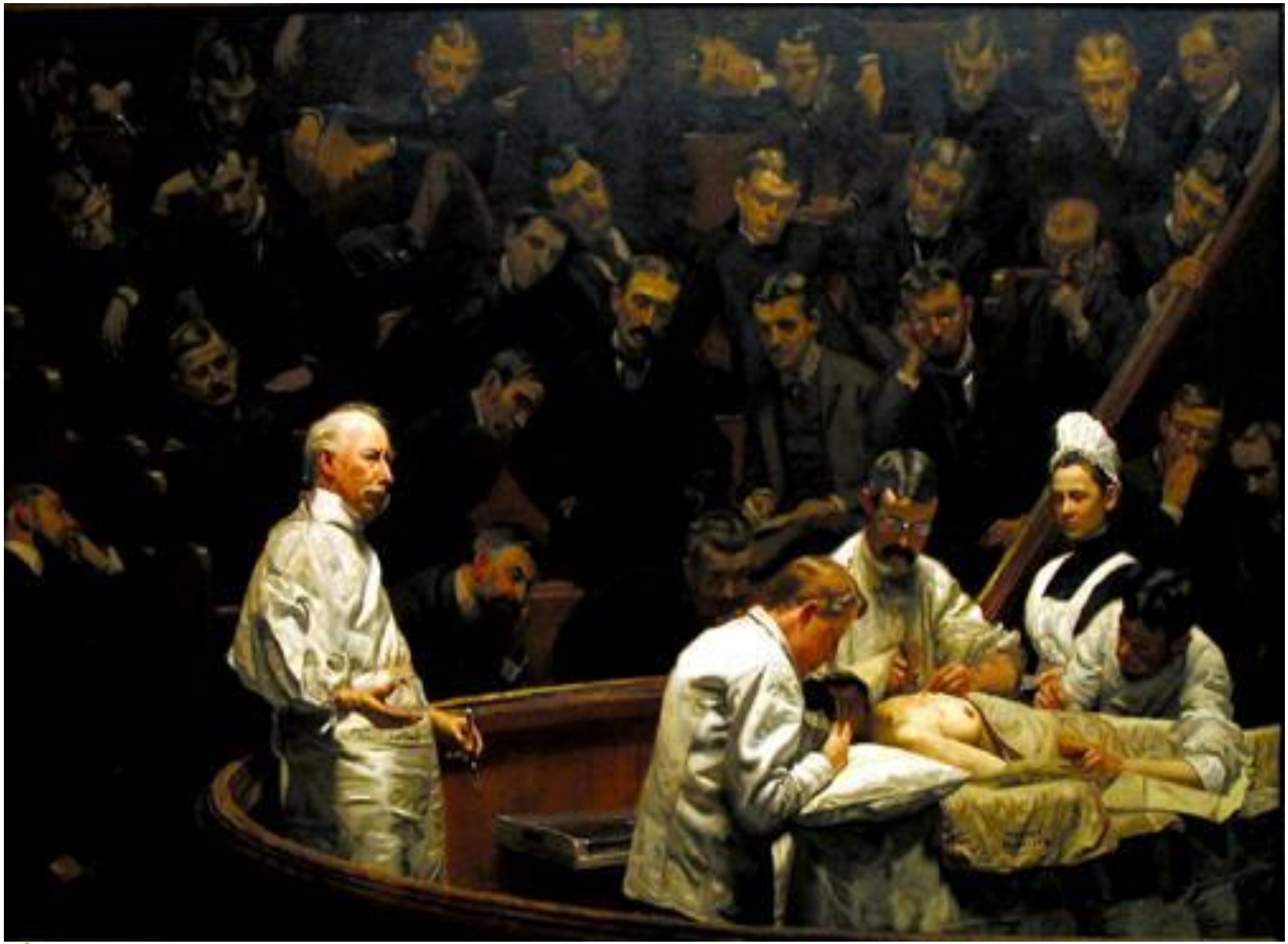
An infection prevention perspective on anaesthetic practice in the operating theatre



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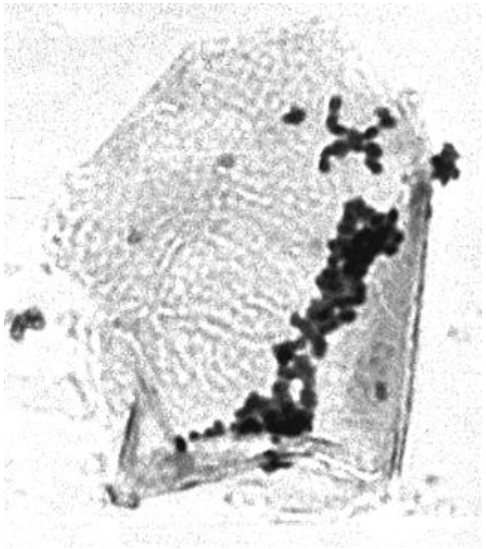
Sources of infection



Endogenous

Patient's own microbial flora:

The human body contains about

- 10^{13} human cells
- 10^{14} resident bacterial cells

Exogenous

Personnel

Humans shed +/- 300m skin squames /day:

>208 000 squames / min

10% support viable micro-organisms

potential inoculation of environment: 100 – 5000 cfu per minute per person in the theatre suite.

- environment (eg. lint)
- air
- medication (eg. re-use of single-use vials)
- solutions

(Remember: General anaesthesia: Immune suppression)

ASA Recommendations for IP

- Disinfection of equipment
- Changing of ventilation bags and lines
- Prevention of contamination of medication
- Prevention of infection during insertion and maintenance of intravenous lines, especially Central Venous Catheters
- Protection of the immunosuppressed pt
- Nosocomial transmission of TB, Hep B
- Occupational exposure

High Risks

- Due to frequent patient changes:
  - the anaesthesia work stations
  - anaesthesia airway equipment
  - anaesthesia ventilation
- Poor or no hand hygiene by the anaesthetic personnel.

Breathing Systems and manual Ventilation Bags

- Breathing systems and the manual ventilation bags are changed immediately after the respective anaesthesia if the following situation has occurred or suspected to have occurred :

- Notifiable infectious disease involving the risk of transmission via the breathing system.

- Visible contamination- blood, secretions etc

Disinfection of equipment

1. Equipment requiring sterility:

   - Any device that enters a sterile body area

   vascular needles & catheters,

   regional block needles & catheters,

   interior of associated tubing, connectors & syringes,

   urinary catheters.

If re-usable – clean & sterilize

Aseptic technique

2. Equipment requiring high-level disinfection - Contact with mucous membranes

laryngoscope blades
oral & nasal airways
temperature probes
face masks
breathing circuits & connectors
resuscitation bags

ET tubes – keep free from contamination: lubricants, stylets, suction caths

Rinse or pre-treat re-usable items immediately after use, clean, then disinfect with HLD or sterilize

Manufacturer's instructions

Filters

Rigid Laryngoscopes

- 2006: 12 neonates die during an outbreak of *P. aeruginosa* in LA
- NNU outbreak: Outbreak strain of *S. marcesens* is isolated from a laryngoscope blade
- Handles: contaminated with *S. epidermidis* and other resistant bacteria

Ideal:

- Adequate blades and handles for the list
- Disposable vs re-usable; ? handle sheath
- Transport blade & handle to decontamination area immediately after use - packaged
- Disconnect, disassemble, remove batteries
- Clean: enzymatic detergent; soft brush; fresh warm water. Soak 2-10 minutes in enzymatic detergent
- Rinse: large volume fresh warm water or demineralized water
- Dry with lint-free cloth; examine.
- High level disinfect or sterilize (NO flashing!)
- Rinse X 3 – fresh water! or demineralized water to adequately remove the sterilant.
- Do not re-contaminate! Proper handling – gloves
- Storage

3.Equipment and Surfaces

- After every patient
- Horizontal surfaces - wiping better than spray & wipe: aerosols
  - choice of disinfectant

- Contamination from highest: flow control knobs, vaporiser dials, breathing system bags, APL valve, monitor.

  2008: J Anaesthesiology: Potentially pathogenic & MDR bacteria transmitted to both the anaesthesia work area and to IV stopcock sets

  2007: J Anaesthesia

  The specific sites showing the most contamination were the surfaces most commonly touched by the anaesthetist during induction of anaesthesia. Also, most of the organisms isolated commonly colonise the upper respiratory tract. This is consistent with the hypothesis that the anesthetist's hands are the main route of transmission of contaminants, and that the patient's oropharynx is the most likely source of contaminants."

Active warming systems

J Hosp Inf Feb 2010: 30 hip implants.

Bair Hugger system does not pose a real risk for nosocomial infections if properly used.

Proper use neither increases bacterial contamination of the air in the theatre nor interrupts laminar flow.

Single use.

Isolate from surgical site with sterile drapes and adhesive strip.

Routine cleaning of unit

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Prevent contamination of medication

Preservative-free ampoules/ vials:

- open as close as possible to time of use
- aseptic technique – alcohol swab
- discard after use
- avoid multi-dose vials

Expiry time of medications:

- Propofol: lipid emulsion: supports bacterial growth that increases rapidly 6 hours after inoculation.
- Discard unused propofol in syringes, reservoirs or administration tubing at end of procedure or within 6 hours after opening ampoule. Flush IV line every 6 hours and at end of procedure to remove residual propofol.

Topical Ointments/Medication

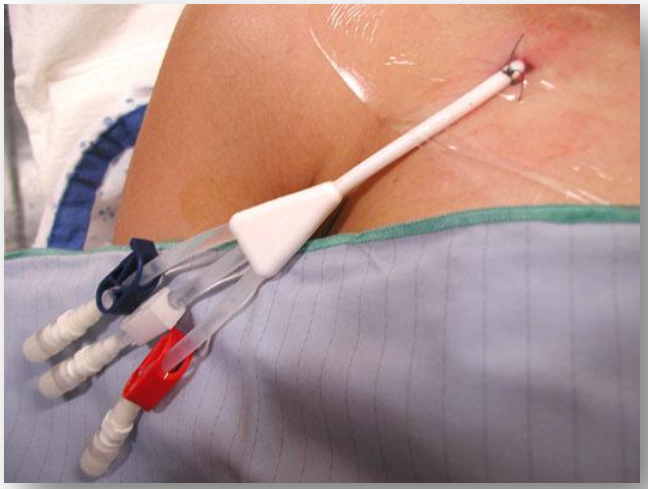
- Topical ointments & sprays
  use unit dose containers or
  discard left overs.

- Syringes:
- Single-use, even if the needle
  is changed
- Mixing medications in 1 syringe
  – chemical physical compatibility
    additional handling

Prevent CLABSI

- Objective :Prevent infection during insertion & maintenance of central venous catheters

  Central line bundle
- Hand hygiene - aseptic
- Maximal Barrier Precautions
- 2% chlorhexidine / 70% alcohol skin antisepsis
- Optimal catheter site selection (subclavian)
- Daily review of line necessity with prompt removal of unnecessary lines
- Use an insertion checklist

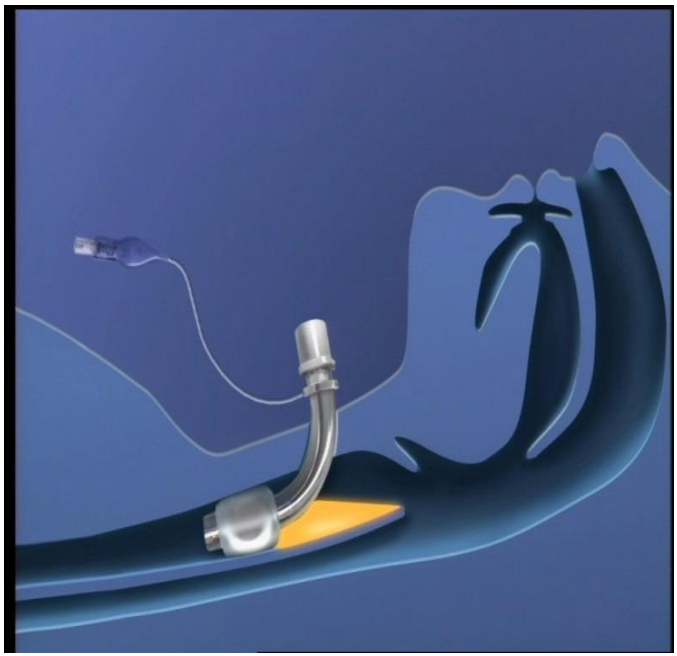


Protect immunosuppressed pt.

- Standard Precautions to prevent transmission of ordinarily benign organisms, eg. Herpes simplex
- Asymptomatic HCW may harbour cytomegalovirus, *P.carinii, S. aureus.*

Transmission of Tuberculosis

- Airborne: Droplet nuclei (1 –5 microns) suspended in air currents
- Delay elective surgery – till pt is on effective therapy, and
  is improving clinically and
  has had 3 consecutive negative AFB smears
- Close theatre doors
- Pt. transported with mask in-situ
- Minimize traffic in theatre
- MDR / XDR: After hours scheduling
- Negative pressure & exhausted air
- Filter between circuit & pt's airway
- Recover in operating room
- Ante-room; UVGI
- Personnel: N95 mask – fit test, seal check



Hepatitis B

- Personnel immunization
- **Vaccination is the most effective measure to prevent HBV infection and its consequences.**

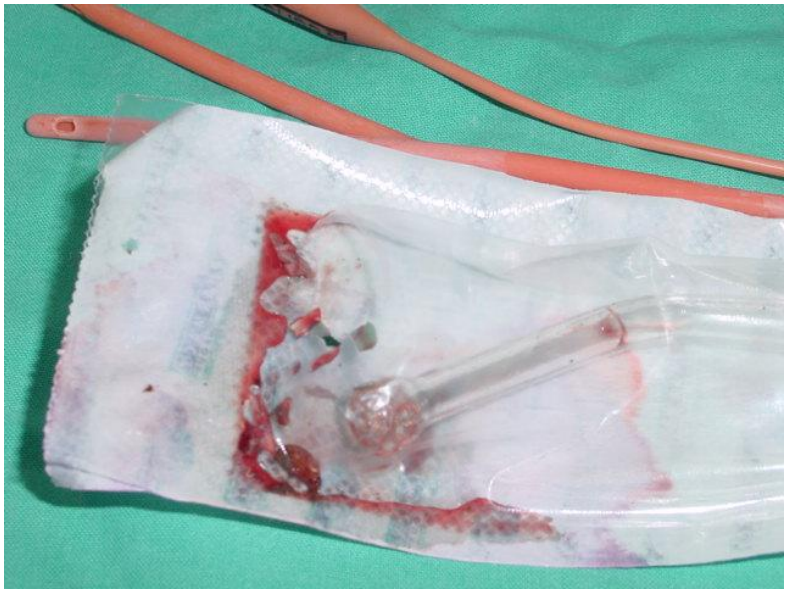
Hep B & C outbreak

- USA: Anaesthetist-related outbreak of Hep B and C.

The anaesthesiologist used a single-use vial of propofol on multiple patients, causing infection in 13 patients.

Cause of contamination: the re-use of syringes to re-dose patients, which contaminated the vials for later patients.

Healthcare Risk Waste



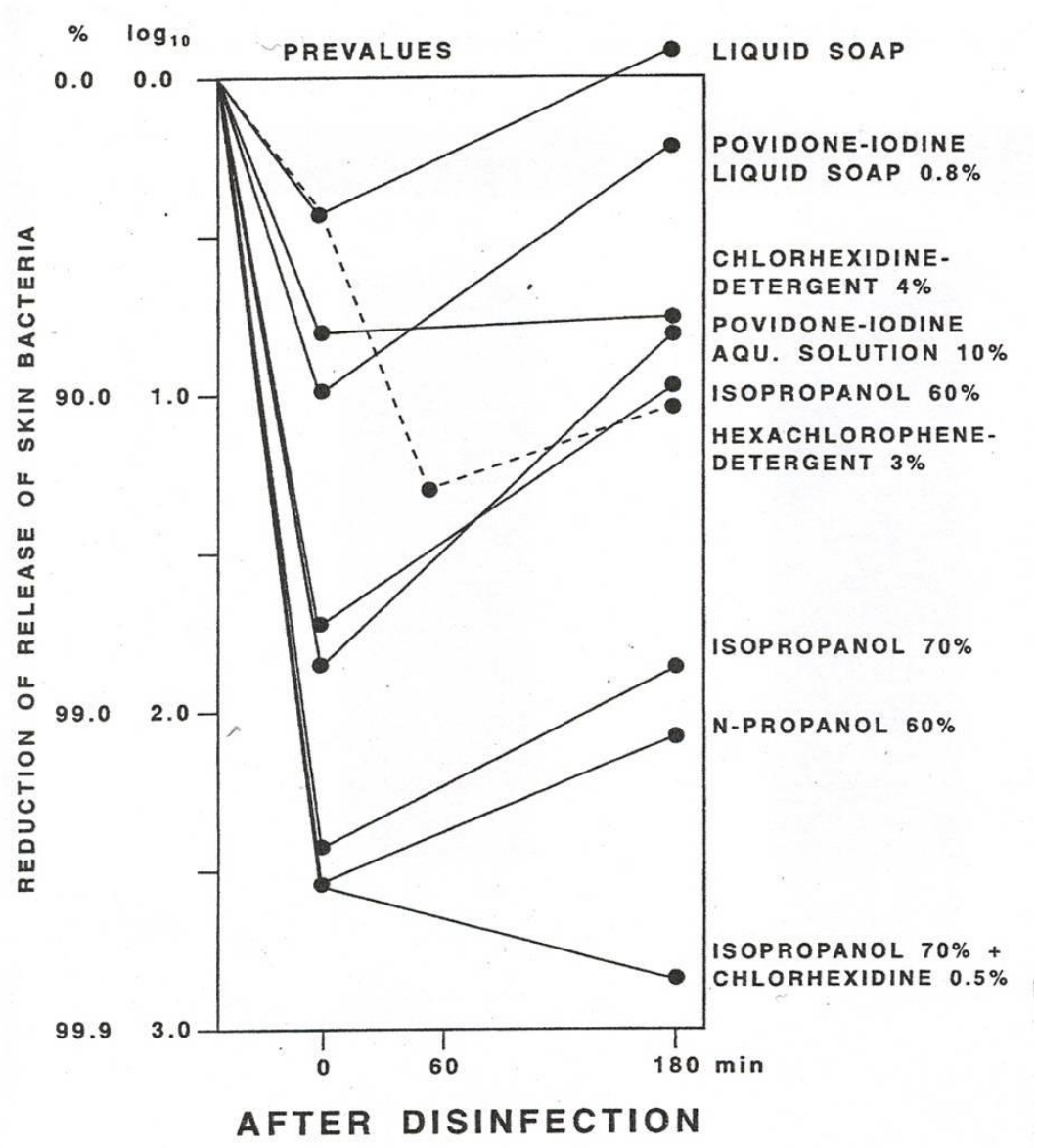
Standard Precautions

ASA IP Guidelines : Conduct of anaesthesia results in a 36% rate of contact with body fluids

- Hand hygiene
- Barriers: Gloves
  Fluid-resistant masks
  Face shields
  Gowns
- Open skin lesions
- Prevent accidental needlesticks
- Blood / body fluid exposure protocol
- Emergency ventilation devices
- Smoke evacuation during use of lasers
  (Viral DNA found in plume. Hold evacuator nozzle close to site, must be functional before, during & after vaporization)

Surgical Hand Disinfection

- Efficacy of various antiseptics for surgical hand disinfection



Rotter ML Handwashing
And Hand Disinfection
p.1738

Thank you