

INFECTION CONTROL

DESIGN AND PRACTICES IN DH DENTAL CLINICS

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DENTAL CLINIC DESIGN MAJOR CONSIDERATIONS

- Operational work flow
- Occupational safety and Health
- **Infection control**
- Ergonomics
- Barrier Free Access
- Comfort
- Professional image
- Esthetic

- Infection control should be considered in the **design stage** of a dental clinic
- Rectification work may be very difficult after operation of a dental clinic

BASIC PRINCIPLES

- **Zoning** clean and dirty zones, clinical area and support area
- **Flows** from clean to dirty
- **Simple** to decrease contact surfaces
- **Seamless** to avoid un-cleansable area
- **Smooth** to allow easy disinfection
- **Durable material** able to withstand repeated disinfection

ZONING

- **Clinical area**-dental surgeries, sterilization room, x-ray room, recovery room...
- **Supportive area**-reception office, waiting area, server room, plant room, pantry, toilets...
- **Use color** for easy compliance, e.g. red for dirty and green for clean

LAYOUT CONSIDERATION





Checklist

Building Services

- ❑ Heating, Ventilation and Air Conditioning
- ❑ Fire services
- ❑ Water supply and drainage
- ❑ Electrical supply
- ❑ Compressed air and suction system

Builder's work

- ❑ Ceilings
 - ❑ Walls
 - ❑ Floor
 - ❑ Cabinets
 - ❑ Doors
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HUMIDITY, VENTILATION AND AIR CONDITIONING

Goal

- Temperature: **22°C** for clinical area (25.5°C for general offices)
 - Relative Humidity: **50-60%**
 - Air Change per Hour (ACH): **2-6**
 - Air flow: **from clean to dirty** area
 - Air Pressure: +ve for clean room, -ve pressure for dirty room e.g toilet
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ACH AND AIR FLOW

- 1 ACH will reduce the concentration of a given contaminant within a room by 67% in 1 hour, whereas a ventilation rate of 6 ACH will reduce the contaminant concentration by more than 99% in the same period
 - American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) recommends **6 ACH for dental department in hospital**
 - The overall air movement of a dental clinic should flow from waiting area to the sterilization area and finally the toilets
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CHECKLIST

Building Services

- Heating, Ventilation and Air Conditioning
- Fire services
- **Water supply and drainage**
- Electrical supply
- Compressed air and suction system

WATER SUPPLY

- CDC recommends <500 CFU/ml (colony forming units of heterotrophic bacteria per milliliter of water)
- The quality of the water supplied by Water Supplies Department (WSD) conforms to the Guidelines for Drink-water Quality recommended by WHO

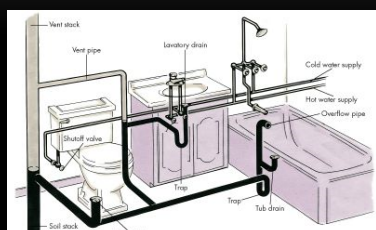
POTENTIAL CONTAMINATION

- Back-flow can occur
- Water is drawn from an appliance into the pipework supplying it
- Any contamination present in the appliance could find its way into water used for drinking or food production, with serious consequences for health

PUT INTO PRACTICE

- **Potable water** supply for domestic use
- **Break tank (non-potable water)** for clinical water supply for medical use, include dental unit, instrument sinks, autoclaves and film processor etc...
- Consult plumbing system designer

DRAINAGE



DRAINAGE

- **Standard gravity drainage system** should be provided in general
- **Sump Pump system**, with drain pipes running in the ceiling void for waste water in dental surgeries should be avoided to prevent undesirable consequences during the break down of the system



CHECKLIST

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 - ❑ Compressed air and suction system
-

ELECTRICAL SUPPLY

- **Emergency power supply** may needed for normal functioning of autoclave
 - **3 phase power** supply for plant room and instant electric water heaters
 - Dental clinics need 3 times electrical power supply
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CHECKLIST

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 - ❑ **Compressed air and suction system**
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COMPRESSED AIR AND VACUUM SYSTEMS

Quality requirement

- Health technical Memorandum (HTM 2022 supplement 1)DH, UK
 - "The compressor should be fitted with an **air-intake filter** and a **post compression filtration and dry system**, to ensures that the air is clean and dry, minimizing the risk of contamination of the system by micro-organism..."
 - **Industrial compressor should not be used**
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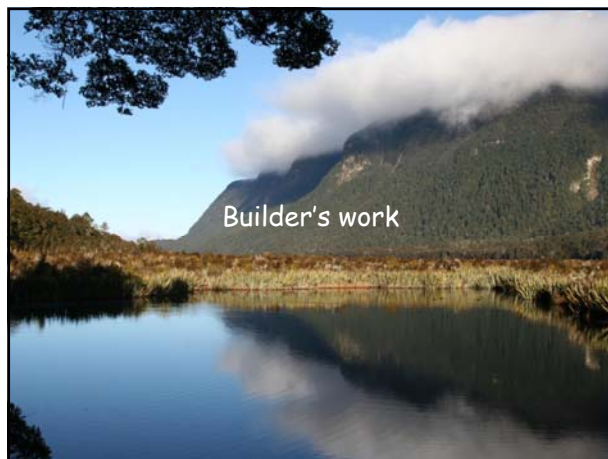
VACUUM SYSTEMS

- **Dry system**- waste water drain away by a separator before the air enters the vacuum pump; the pipes remain dry
 - **Wet system**- waste water and air enter the vacuum pump, where they are separated; the pipes are wet
 - **Semi dry system**- similar to dry system, but the vacuum pump and separator are combined; the pipes are wet before enter the pump
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- In dry systems, the vacuum line is relatively dry and clean compared with wet system, which helps minimize bacterial contamination of the vacuum line
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VACUUM EXHAUST FILTRATION

- The **exhaust** from the vacuum system should be sited **outside**, away from air intakes, opening windows etc(preferably above roof level) and be clearly labeled
 - A **bacterial filter** (HEPA filter) should be inserted in the system, preferably between pipework and vacuum pumps
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CHECKLIST

Builder's Work

- ☐ Ceilings
 - ☐ Walls
 - ☐ Floor
 - ☐ Cabinets
 - ☐ Doors
-

CEILING

- **Aluminum** false ceiling with acoustic features to reduce the growth of fungus
 - Arrange the "air return" near the entrance to avoid dropping of dust over the clean area
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CHECKLIST

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- Ceilings
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WALLS

- Cleansable, smooth and anti-fungal
- Non VOC emulsion paint, vinyl sheet, compact board, or ceramic tiles
- Avoid too much texture

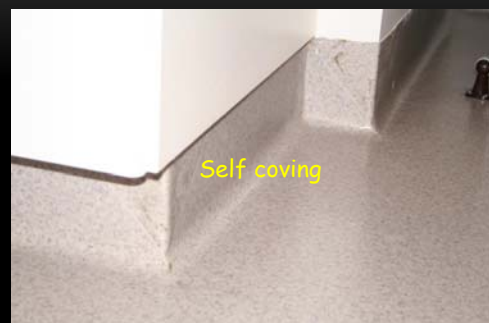
CHECKLIST

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FLOOR COVERINGS

- Vinyl flooring sheet with self-coving skirting(No need for separate skirting)
- Wax free and high coefficient of resistance
- All joins sealed
- Avoid carpet and wooden flooring





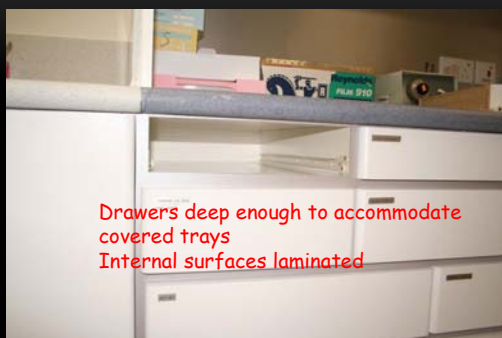
CHECKLIST

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- ☐ Doors

CABINET

- Design to facilitate routine disinfection
- Simple, smooth and seamless
- Able to withstand Alcohol and bleaching solution
- Avoid open shelf
- Solid surface countertop and laminated wood (include all the inside surfaces)
- Drawers should be deep enough to enhance flexibility and placement of covered trays



PROPRIETARY PRODUCTS



HAND WASHING BASIN

- At least 1 in a dental surgery, not to share with instrument cleaning sink
- Medical grade hand free tap and dispenser preferred
- No overflow protection and plug needed

HAND WASHING BASIN



CHECKLIST

Builder's Work

- ▣ Ceilings
- ▣ Walls
- ▣ Floor
- ▣ Cabinets
- ▣ **Doors**

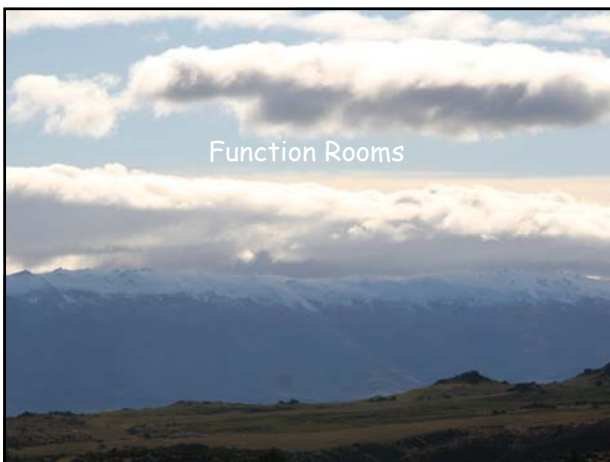
DOORS

- Door knobs can serve as a fomite to indirectly transmit infectious organism
- Need regular disinfection



- Consider automatic doors with hand free sensor or foot control



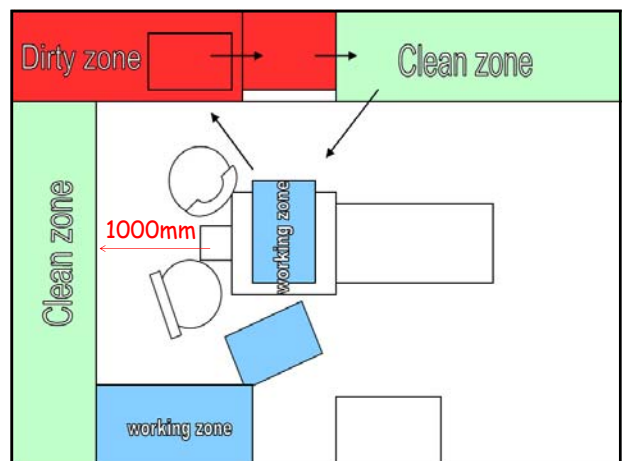


FUNCTION ROOMS

- Dental surgery
- Central sterilization room (instrument reprocessing area)
- X-ray room and film processing area
- Laboratory

DENTAL SURGERY

- Optimize size for ergonomics, OSH, and infection control
- Simplified cabinets to minimized contacts
- Zoning should be clearly delineated
- **1 meter space** from the patient's mouth to the bench top to avoid splatter contamination

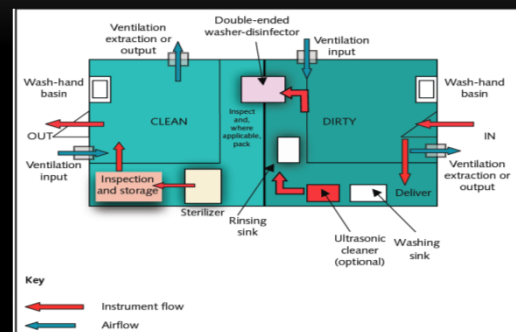




STERILIZATION ROOM

- CDC "...should process all instruments in a designated central processing area to more easily control quality and ensure safety. The central processing area should be divided into sections for
- 1) receiving, cleaning, and decontamination;
- 2) preparation and packing;
- 3) sterilization; and
- 4) storage

BEST PRACTICE STERILIZATION ROOM



PRACTICAL STERILIZATION ROOM LAYOUT

