Evaluation of automated UVC disinfection systems in acute care hospitals

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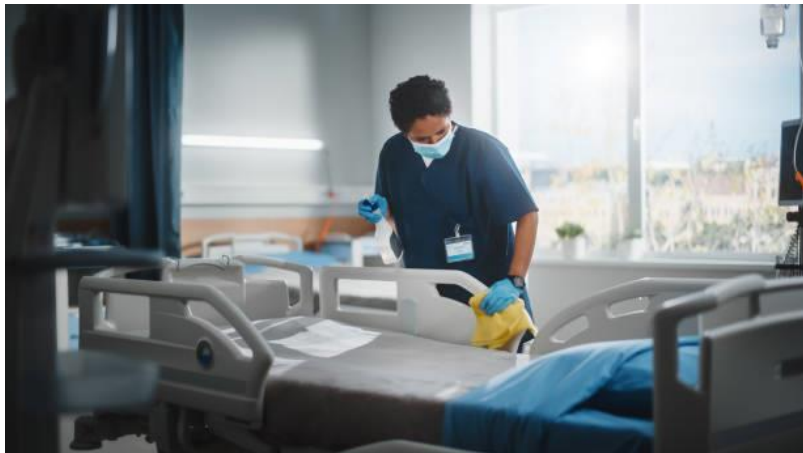Adila Zahir, RN, DESS, MScN

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Background

- Terminal cleaning and disinfection at patient discharge (laborious and repetitive)

- Evaluation of different technologies currently used

- UVC disinfection

- Manual cleaning

- Hydrogen Peroxyde

- Electrostatic desinfection

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Update of evaluation

Objectives of evaluation

1. How clean is clean enough?

2. Mapping of patient rooms

3. Comparison of UVC devices (stationary and autonomous mode) to test the Impact of height and distance of UV source (gray zones)

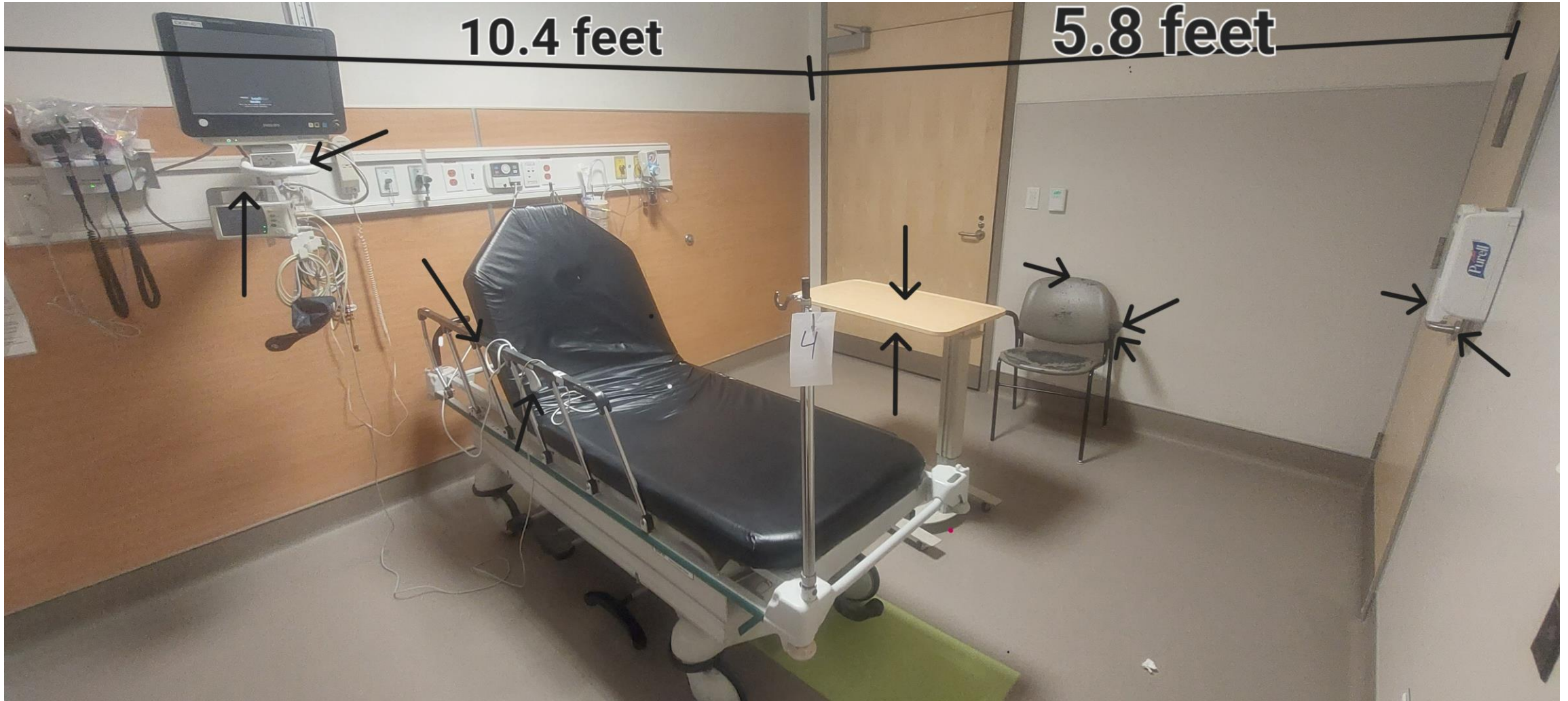# Mapping of contamination

- **Objective**:

- Estimate true level of contamination in patient room after patient discharge
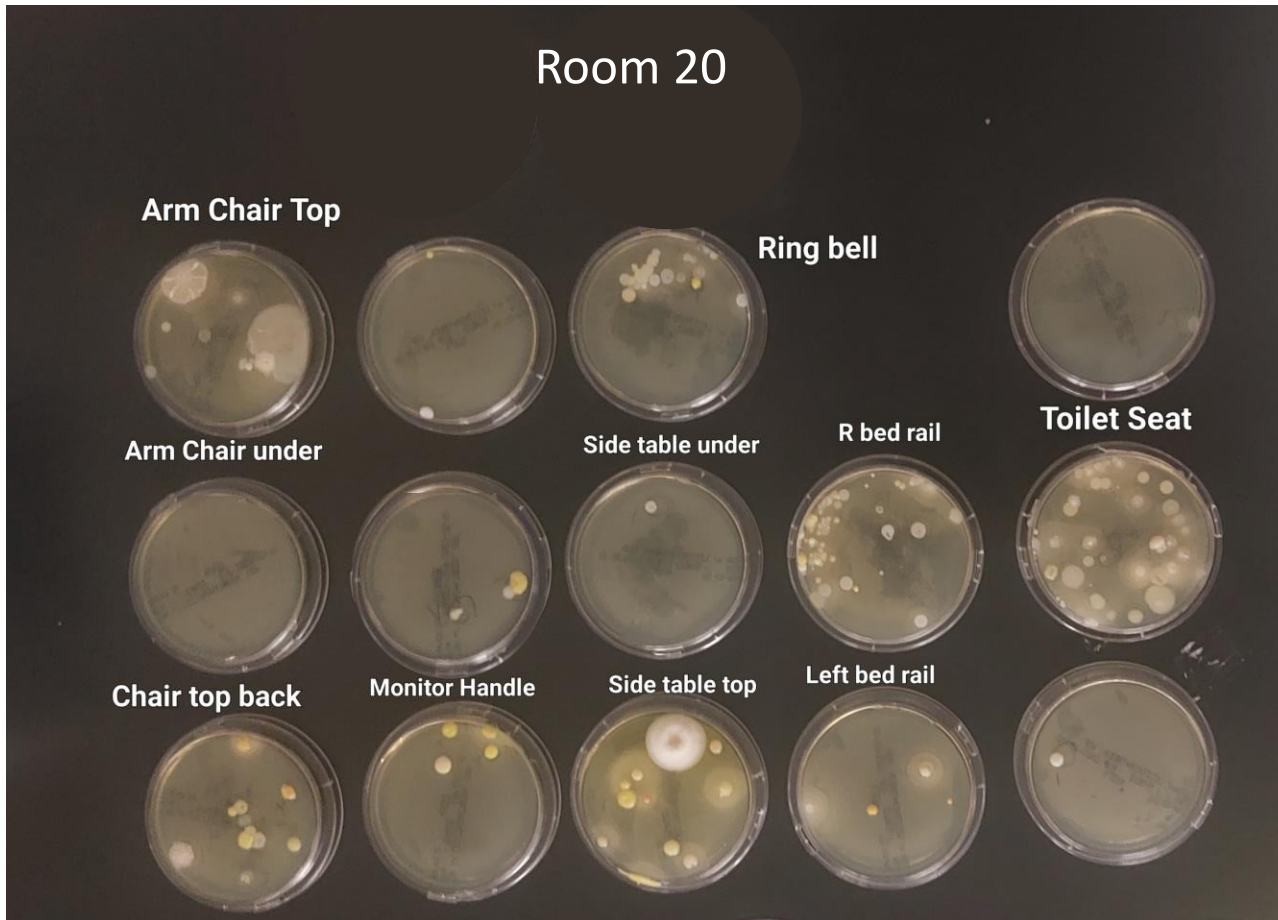
Mapping of contamination

- Location: 3 rooms in ED (green 4, orange 16 and yellow 20)

- 14 sites per room (not only high touch)

Sampling strategy :

- Bacterial growth assessed by using contact plates incubated 37C x 18-24hrs

- Quantification and identification of bacteria recovered

10.4 feet   5.8 feet

Mapping of contamination

Room 20

1. Right side bed rail
2. Left side bed rail
3. Ring bell
4. Side table (Top)
5. Paper dispenser handle
6. Monitor Handle
7. Screen Intelli-Vue
8. IV pole Handle
9. Hand sanitizer
10. Chair (Top back)
11. Arm Chair (Under)
12. Arm chair (Top)
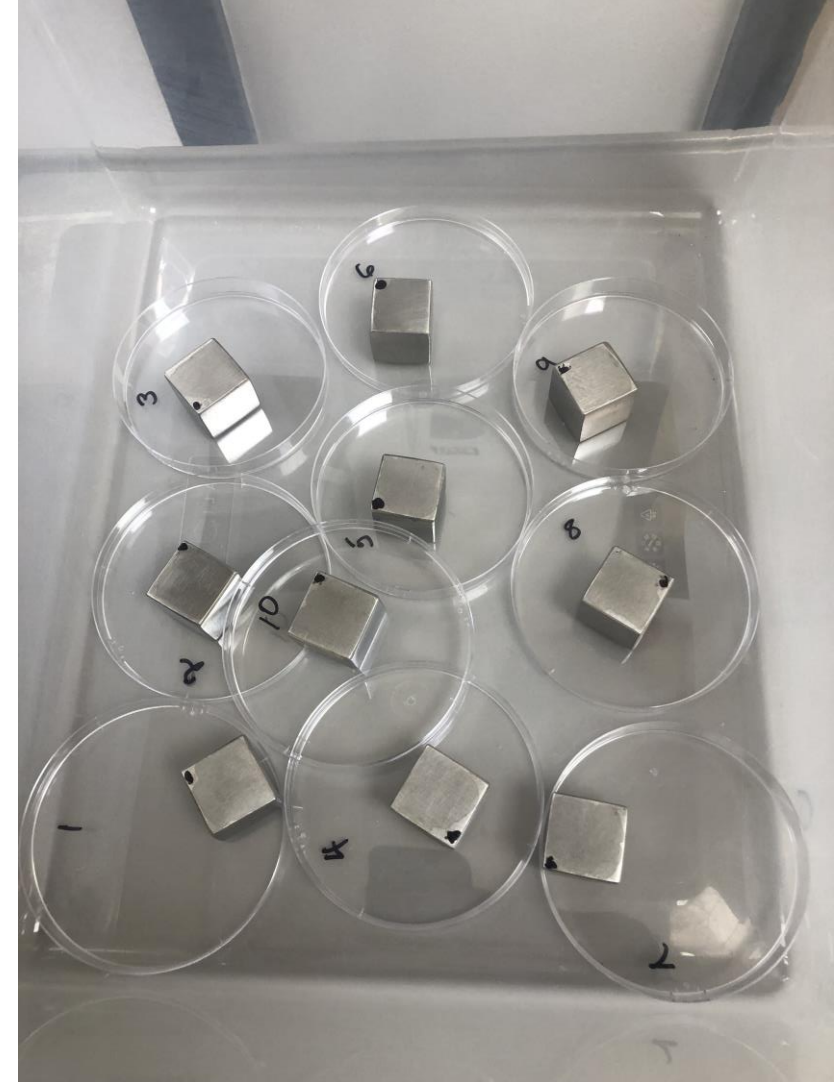13. WC Door Handle
14. Toilet seat

Mapping of contamination

- Duration of patient stay in rooms prior to discharge:
  - 13h, 17h and 14h

- Bacterial load: median, 5 CFU/ 25cm2
  (IQR, 2 to 13 CFU/25cm2)

  - Room 4: 11 CFU/25cm2
  - Room 16: 2 CFU/25cm2
  - Room 20: 6 CFU per 25cm2

- Some areas heavily contaminated
  - Toilet seat TNTC
  - Bed rail 67 CFU/25cm2

- Most bacteria recovered = non-pathogens
  - E.g. M luteus, Corynebacterium, Staph sp

- 4 pathogens (10% of samples)
  - Pantoe agglomerans (2), E cloacae,
   Moraxella osloensis
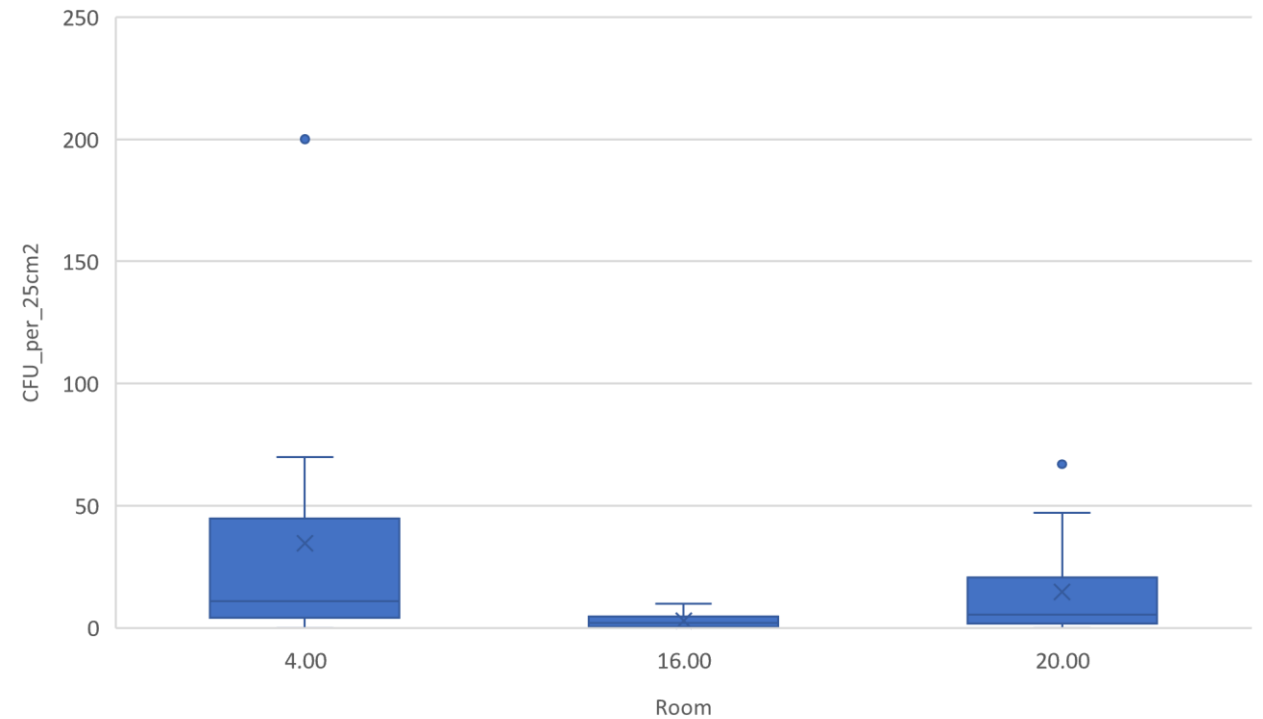
Comparison of UV devices Method

- Stainless steel cubes contamination

  - A single surface contaminated with approx 10e7 CFU S aureus
  - Placement of contaminated stainless steel cubes in strategic locations in the room
  - Effectiveness of disinfection assessed by calculating the residual bacterial load on the test cube compared with an unexposed control
  - Sampling of cubes: by immersion in sterile bag and serial dilution on blood agar plates
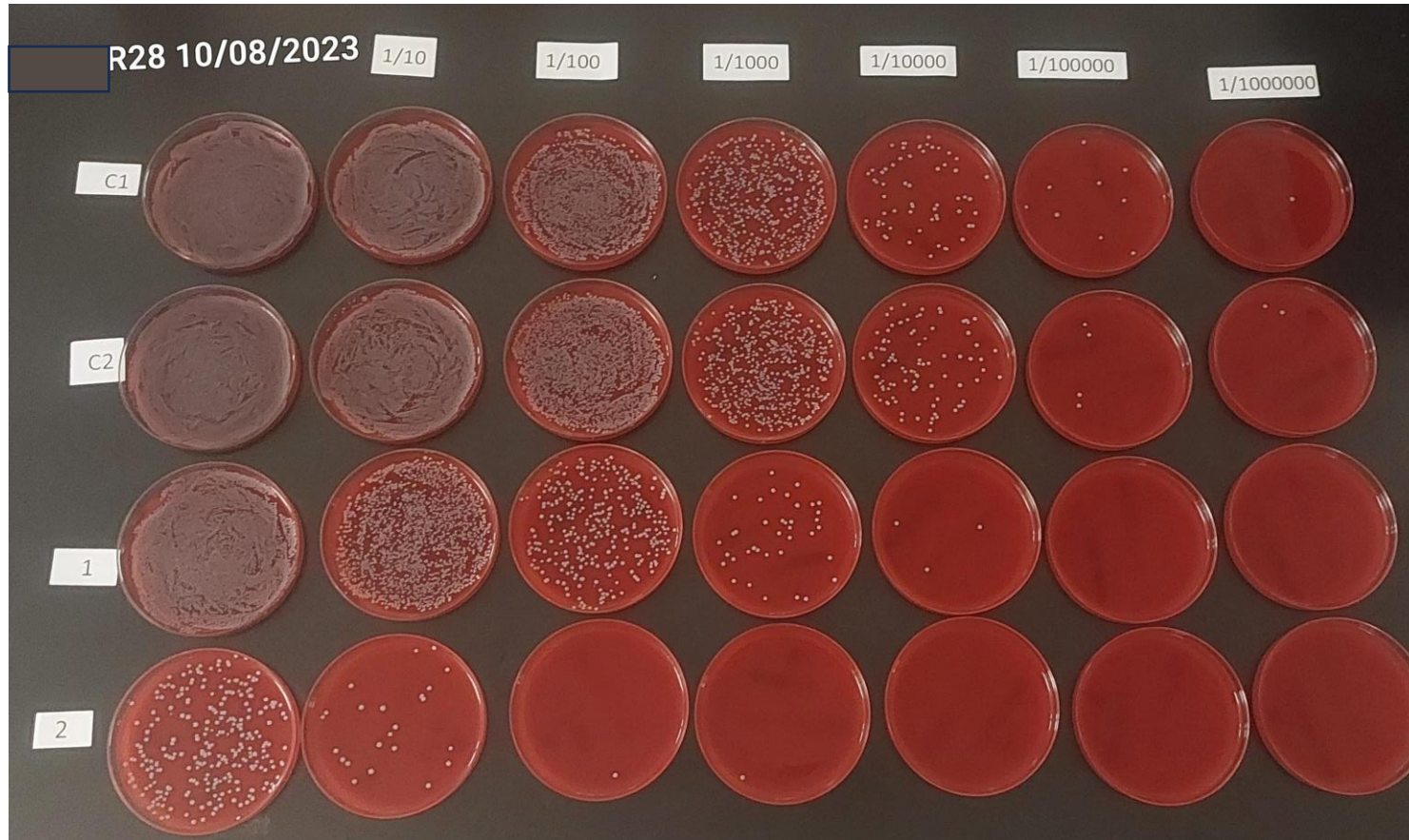
Strategic locations

- 1 Right bed side rail (Top)
- 2 Right bed side rail (facing the device)
- 3 Right bed side rail (facing the other side of the device)
- 4 left bedside rail
- 5 Cardiac Monitor Handle
- 6 Intellivue
- 7 bathroom door handle
- 8 Overhead table (Top)
- 9 Chair handle (top)
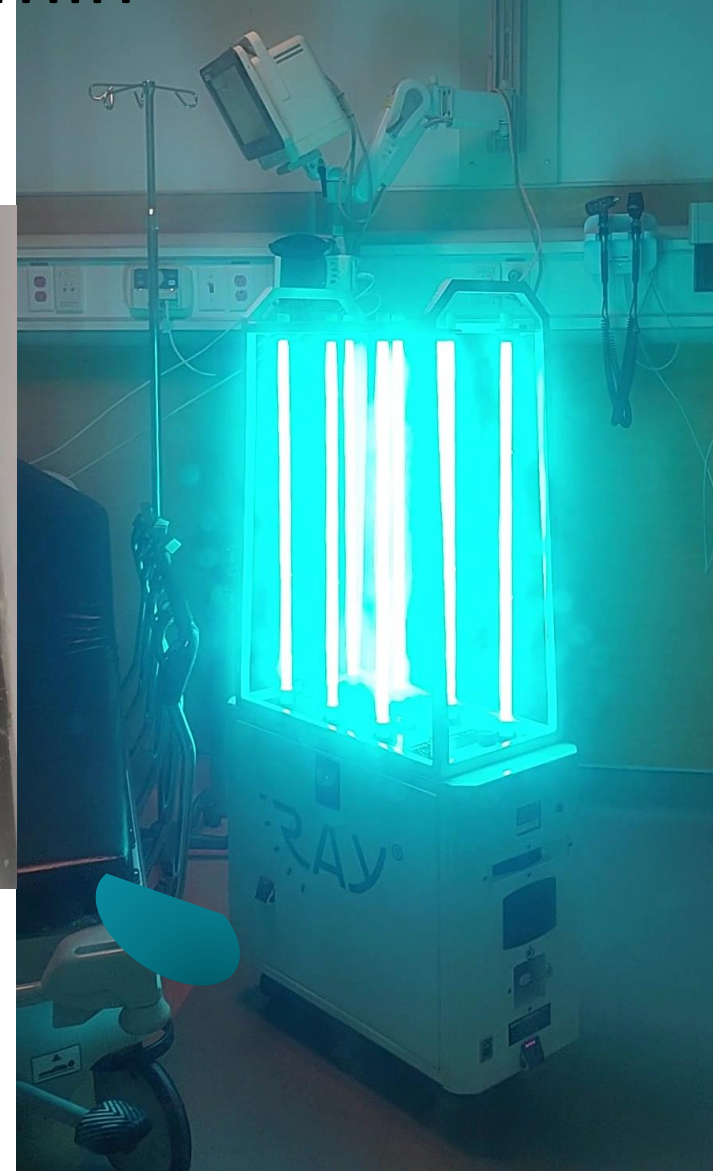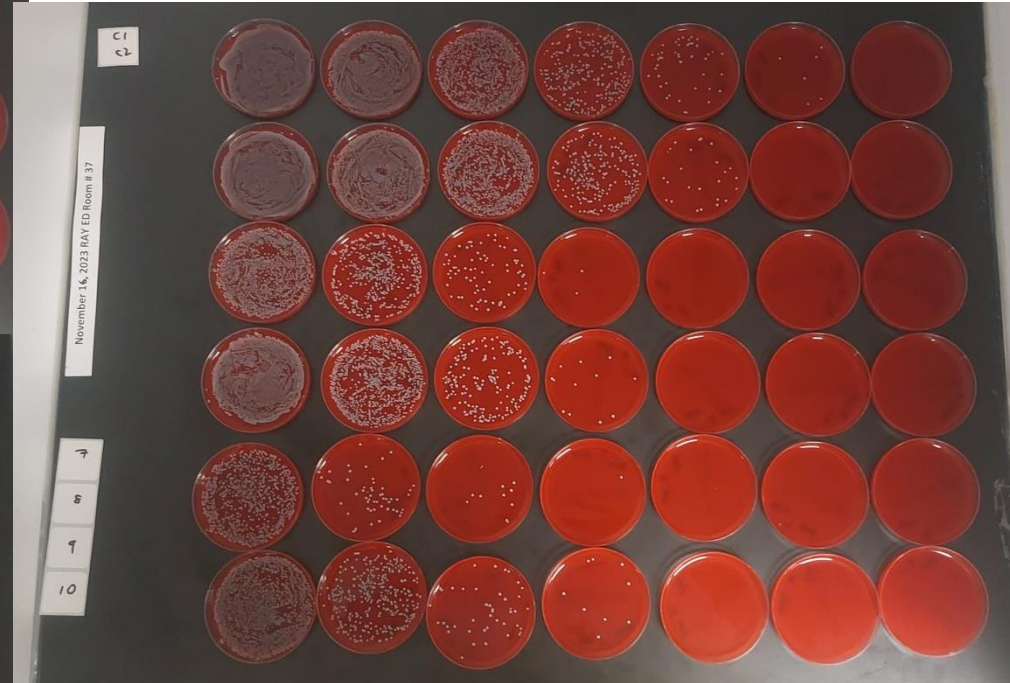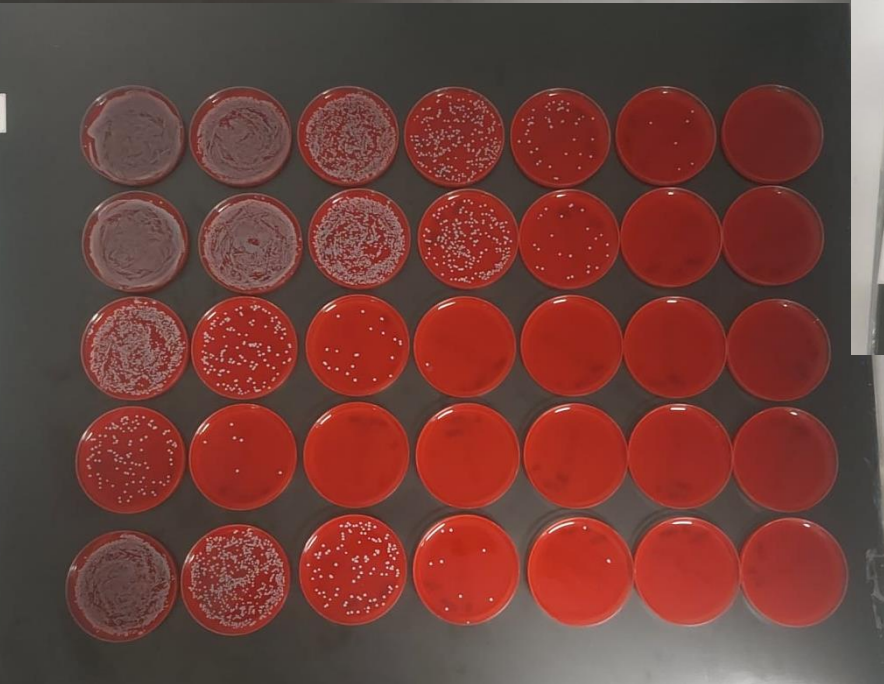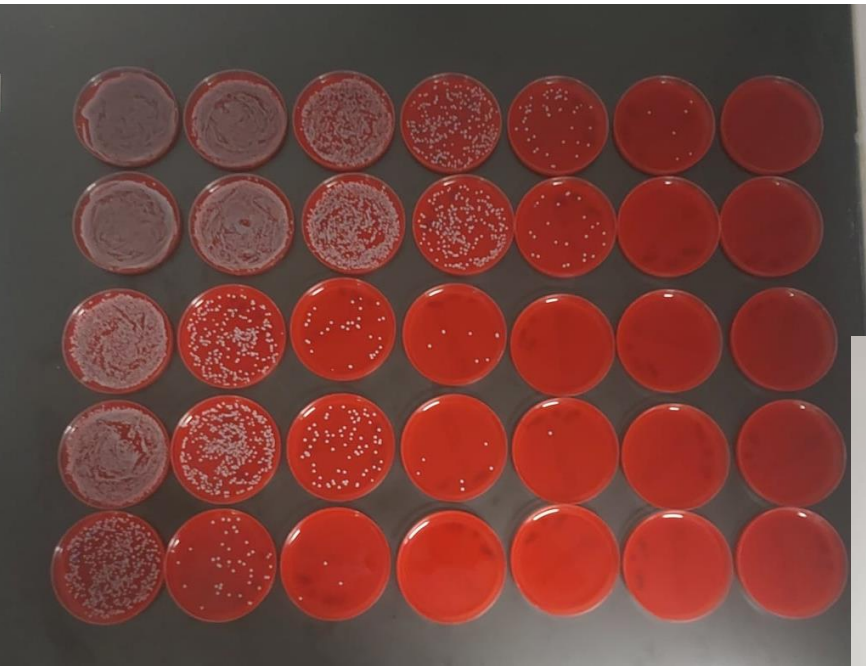- 10 Chairback (facing the device)

Stationary portable devices 7 min
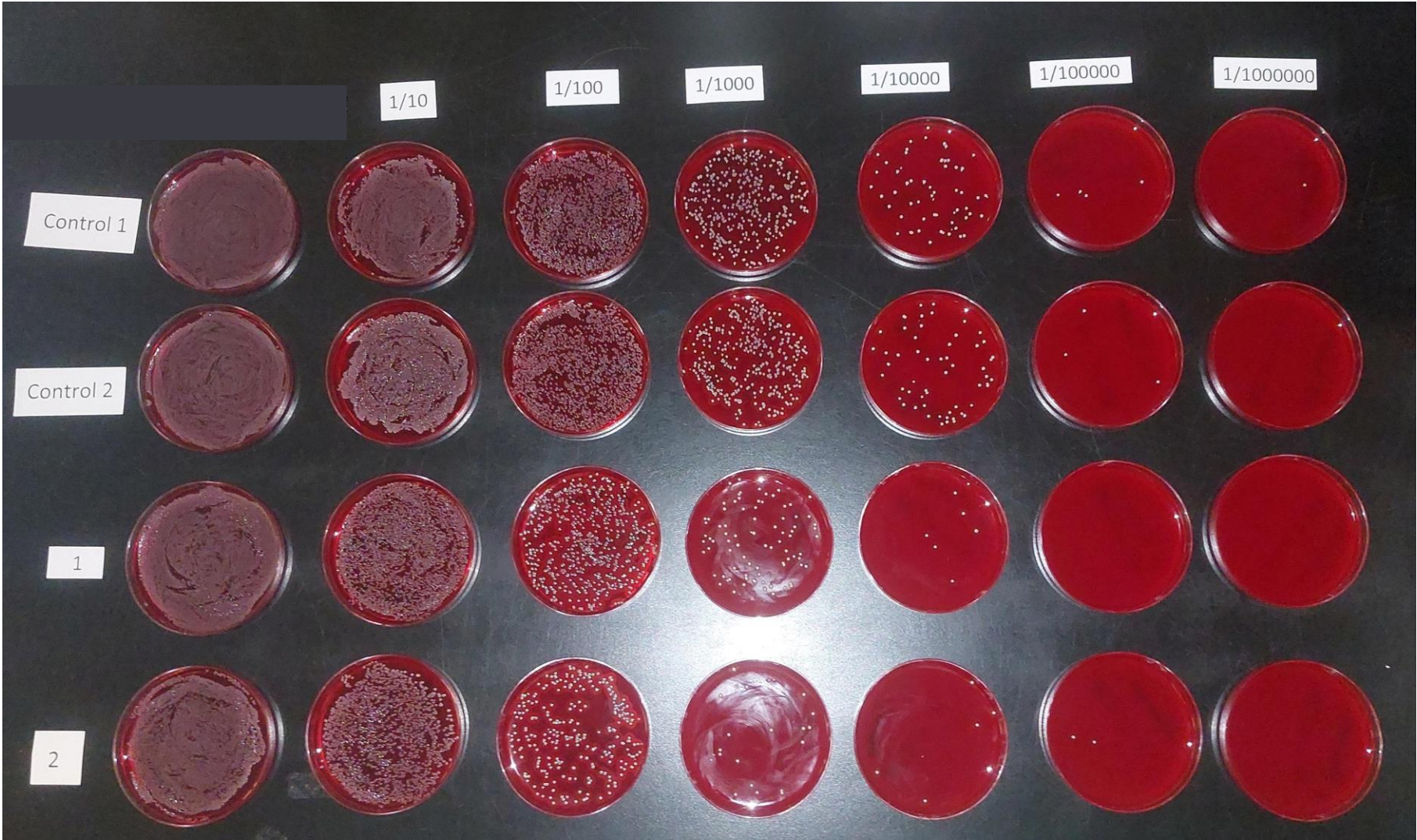
Stationary 7 min run

Autonomous device 7 min

Conclusion

- Automated UVC disinfection could replace the second terminal disinfection step following discharge of patients with MDRO

- Automated UVC disinfection is sufficiently effective given room contamination mapping.

- It is much faster than other devices.

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Thank you!