‘Without getting in the way’: Designing a decontamination intervention study to optimise sampling without impacting patient care.

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BACKGROUND

Microbial contamination of the hospital environment can cause healthcare associated infections. This is reduced by decontamination methods that are initially evaluated within a controlled laboratory setting. Translating promising in-vitro results to a clinical environment is challenging. Often these challenges result in studies undertaken over short timespans or only targeting vacant beds, limiting their impact and scope.

OBJECTIVE

To develop a minimally disruptive environmental sampling protocol for a longitudinal decontamination intervention study using cold air plasma (CAP) on an intensive care unit (ICU).

METHODOLOGY

The study design was informed by previous literature relating to in-vitro testing of CAP and environmental surface contamination patterns in ICUs. Near-patient sites in four patient occupied isolation rooms of an ICU in a tertiary referral hospital were sampled using 3M Petrifilm and swabs. Over four-months, adjustments to sampling were made to optimize access to isolation rooms without disrupting care.

RESULTS

Issue: Which area should be targeted?

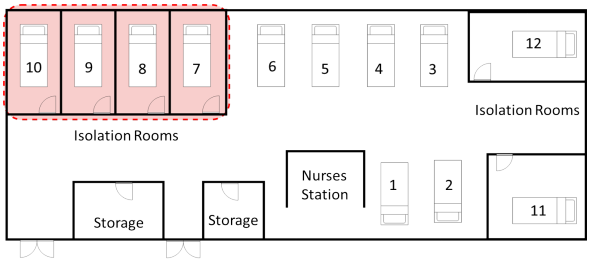


***Figure 1**. The ICU isolation rooms 7-10 were chosen as isolated patients were most likely. In theory these rooms could be a potential source of MDROs for the rest of ICU.*

Issue: Which site should be targeted?

***Figure 2.** An ICU isolation room.*

Sampling sites need to be:

- Accessible
- High touch and near patient
- Allow for more than one sample
- Be easily treated by CAP, a dry disinfectant.

The ICU contains 12 Hill Rom 900 beds which have a polypropylene split bedrail design with integrated controls (fig.2).
Many research studies have shown the bedrail to be highly touched and frequently contaminated.

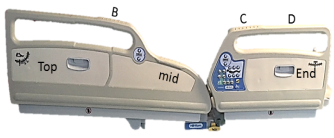
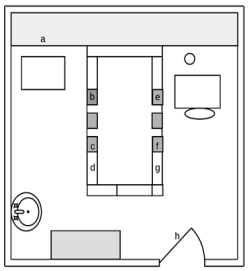


***Figure 3**. Bed rail with zones.*

As the bedrail does not have a midpoint sampling was split into zones.
The bedrail (fig.3) contains 4 textured parts for easier grip and 4 smooth parts. Area B is closest to the patient’s head.



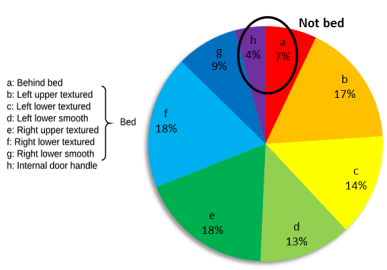


***Figure 4.** Areas sampled in ICU room and a pie chart showing percentage of areas with >2.5cfu/m² (a hygiene cut-off point) (n=277).*

Issue: When is the best time to target an intervention?

Part of the project was discovering a time to employ the intervention at a time of greatest surface contamination.

Sample time	n	CFU/Petrifilm	CFU/cm²	Log_{10}
9-10am	130	35	1.7	1.3
11-1:30pm	115	44	2.2	1.4
2-3pm	22	**78**	**3.9**	**1.6**
4pm	42	33	1.6	1.2

***Table 1.** Petrifilm results from bedrail samples taken at different times of day.*

- We needed to be able to access the rooms without impacting patient care or comfort. Although the highest cfu/m² were at 14.00h, there were issues with room access as visiting time was between 1-3:30pm.
- On 79 (23%) sampling occasions , we were unable to gain access to the room due to visitors, end of life care and procedures being performed.
- We increased the efficiency of sampling from requiring 5 minutes to 3 minutes meaning less impact on patient care.

	C	D	F	G
9am	83	81	60	34
12pm	63	58	59	48
3pm	38	27	43	37

***Table 2.** Comparison of the cfu/Petrifilm of bedrail sampling sites at different times (n=20); the highest counts were at 09.00h but logistics favoured 12.00h.*

CONCLUSIONS

1. Sampling of an occupied ICU space needs to be reproducible, relevant and not impact the day-to-day activities.
2. The bedrail is highly contaminated and a good candidate for focused disinfection and it has multiple sampling sites.
3. For a study to be reproducible, sample at a tine when there is greatest access with minimal impact on patient care.

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