Are Compromised Support Surfaces a Vector for Transmission?

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INTRODUCTION

- From scrubbing in, to sterile fields, the focus on infection prevention is a standard for all surgical care.
- In acute care hospitals, the prevalence of damaged mattresses tends to be the highest in the operating room (OR), emergency room (ER), and medical inpatient units, respectively.[1]

OBJECTIVE

- The purpose of this testing was to examine the potential contamination risks when OR table pads lose their outer structural integrity.

METHODS

- Utilizing Wet Bacterial Penetration (WBP) testing it was determined that "non-disrupted" surfaces (no tears, frays, abrasions, or any other disruptions to the manufacturer's design) were impervious to fluid.
- Provided that the support surface was impermeable, the team employed the Martin Dale Fraying test in further attempts of surface disruption.
- Utilizing the Martin Dale Fraying test, a simulated 175,000 rub cycle was completed on the support surface cover.
- The choice of 175,000 rubs was used to simulate cleaning cycles based on the average amount of OR cases in a OR Table pads normal life-cycle (3 years): 10,452 cases. (67, SD=14 case per weekday)[2].
- After this simulated rub cycle, the surface remained intact.
- As, such, the team then made incisions of varying sizes (.25", .5", .75", 1", 2") and reperformed the WBP testing.

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Wet Bacterial Penetration (WBP) Test

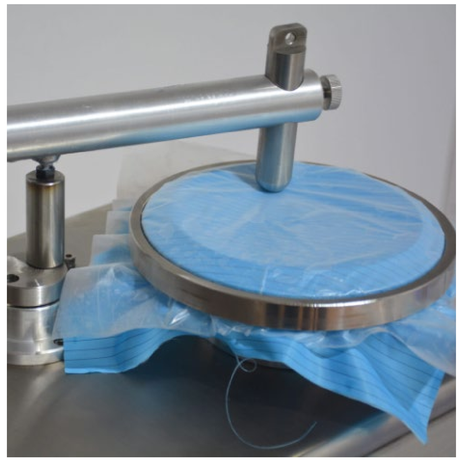

Figure 1: Wet Bacterial Penetration (WBP) test to determine surface disruption.

Martin Dale Fraying Test

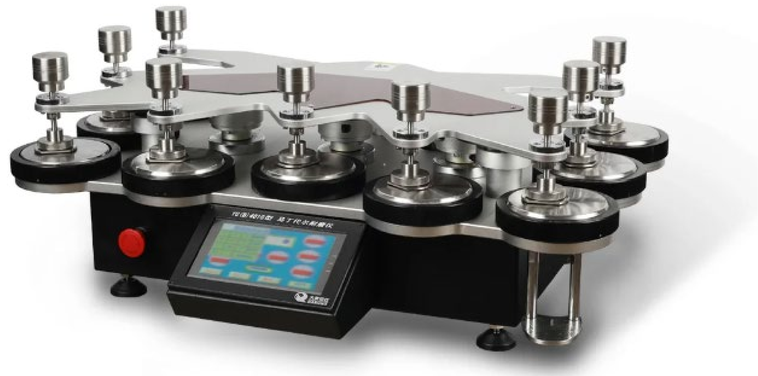

Figure 2: Martin Dale Fraying test to simulate 175,000 rub cycles.

Table 1. Results						
Sample	OR Pad Outer Soft Vinyl Material		**Distance of Agar from Brim**	3.0 mm		
Carbon Control	Pass		**Inoculum Verification**	3.9×10^4 CFU/mL		
Colony Counts (CFUs)						
Sample	**Plate Number**					
	Plate 1	Plate 2	Plate 3	Plate 4	Plate 5	Plate 6
1 (0.25 in. Incision)	25	9	6	6	1	0
2 (0.5 in. Incision)	2	0	1	0	0	15
3 (0.75 in. Incision)	28	31	4	0	0	57
4 (1.0 in. Incision)	0	0	0	0	0	0
5 (2.0 in. Incision)	108	6	1	1	1	2

Table 1: There was a 149% increase in penetration from smallest incision test sample to the largest incision test sample on plates 1-5. Test plate 6 was not included in the calculation as it is used as an approximation of bacteria left on the sample after each test run.

METHODS (CONT'D)

- Percentage Increase (% increase) was calculated as follows:
  (Largest Incision Recovery (Total CFUs Plates 1-5) - Smallest Incision Recovery (Total CFUs Plates 1-5) ÷ Smallest Incision Recovery (Total CFUs Plates 1-5)) x 100.
  ((117 CFUs – 47 CFUs) ÷ 47) X 100 = 149%
- Test plate 6 was not included in the calculation as it is used as an approximation of bacteria left on the sample after each test run.

RESULTS

- Using the WBP test and prior to making the varying incisions, it was determined that a non-disrupted surface (no tears, frays, abrasions, or any other disruptions to the surface) was impervious to any fluid.
- After creating incisions of varying sizes, the WBP testing revealed that there was a 149% increase in fluid penetration or organism recovery from the lowest disruption (.25") to the highest (2") disruption.

CONCLUSION

- These results highlight the need for proper support surface inspections as larger disruptions are associated with increased colony growth.
- While these results do not directly correlate to an increased risk of communicable pathogen colonization and subsequent spread, they do cause concern for compromised surfaces as a vector for transmission.

REFERENCES

1. Marks, B. (2016). Uncovering the prevalence of damaged mattresses. Explore (Spring), 17-18.
2. Zinouri N, Taaffe KM, Neyens DM. Modelling and forecasting daily surgical case volume using time series analysis. Health Syst (Basingstoke). 2018 Jan 15;7(2):111-119

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