



Evaluation of the ATP Method for Cleanliness Control and Its Role in Improving Care Conditions in the Pulmonology Clinic of the University General Hospital of Larissa

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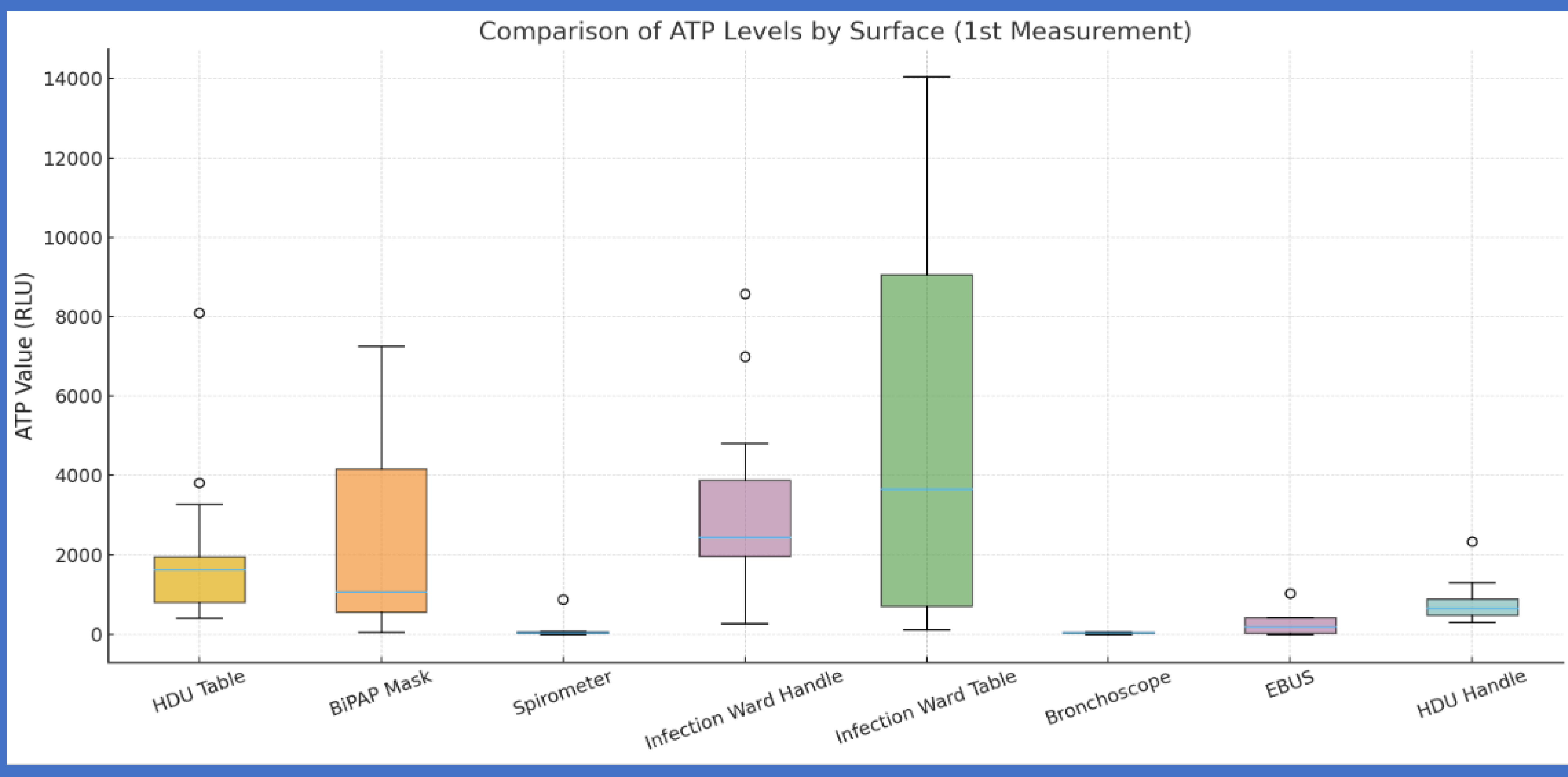
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INTRODUCTION:

- Cleanliness of hospital environments is essential for preventing healthcare-associated infections (HAIs).
- Adenosine triphosphate (ATP), serves as a sensitive marker of organic contamination from microorganisms or biological residues.
- ATP bioluminescence testing provides a rapid, quantitative, and objective assessment of cleanliness.

AIM:

- This study aimed to evaluate the effectiveness of ATP bioluminescence in quantifying surface and equipment contamination in pulmonology wards, including a negative-pressure isolation room, under real-world clinical conditions.



METHODOLOGY:

- High-touch surfaces and respiratory equipment were selected based on contact frequency
- Each site was sampled at three time points: before disinfection, 2–3 hours after, and 5–6 hours after.
- Sterile, pre-moistened swabs with luciferase–luciferin reagent were processed in portable luminometers, and rlu values were recorded.
- Non-parametric tests compared RLU distributions and examined recontamination trends.

RESULTS:

- ATP testing revealed heavy contamination before disinfection (outliers >8,000 RLU).
- Significant decreases occurred 2–3 hours post-cleaning (median ~3,282 and 831 RLU) - partial recontamination was observed 5–6 hours later (up to ~1,958 RLU, $p = 0.03125$).
- Bedside table in the negative-pressure isolation room showed the highest and most variable RLU values (up to 14,050 RLU)
- Handles (742–2,341 RLU) remained persistently contaminated, while medical devices such as the spirometer (≤ 883 RLU), bronchoscope (≤ 73 RLU), and EBUS ($\leq 1,036$ RLU) exhibited lower readings. The
- BiPAP mask demonstrated extreme variability, with outliers up to 7,256 RLU.

CONCLUSION:

Although disinfection significantly reduced ATP levels, microbial load rose again within hours, particularly in high-risk areas such as the negative-pressure isolation room. Continuous ATP monitoring and repeated, targeted cleaning are essential to sustain safe environmental conditions and minimize HAIs in pulmonology units.