

Improving environmental cleanliness in operating room: staff education based on adenosine triphosphate readings

Lina.Y Jian.Z Qian.X Yu.L Xiaohui.H Rong.T

Introduction

Environmental cleanliness is a fundamental part of infection prevention in hospitals, especially in the operating room. The quality of room cleaning and disinfection should be monitored to reduce the risk of healthcare-associated infections (HAIs). There are several monitoring strategies ranging from simple visual inspection through microbiologic testing of surface contamination to fluorescent labeling. Adenosine triphosphate (ATP) bioluminescence assay kits were reported to be used in ICUs to detect organic debris on surfaces because they are easy to use and can provide direct, rapid feedback to staff. In this study, using the AccuPoint 2 Sanitation Monitoring System (Neogen Corporation), we assessed contamination of the working environment surface before and after surgery. The aim of the study was to ascertain the effect of staff education on environmental cleanliness by taking ATP readings in the operating room.

Method

A quality improvement initiative was developed in operating room in a general hospital in China, a 4132-bed inpatient facility, with 45 operating rooms. From October to December 2018, the head nurse monitored the presence of organic soil using ATP bioluminescence in the operating rooms, including 12 designated areas and 3 random areas. Monitoring was carried out on any day of the week, both before the first surgery, and after the second surgery when the disinfection had taken place. The head nurse randomly visited the operating room to perform the test in the presence of staff in charge of cleaning and disinfection. The ATP readings were shared immediately with the staff, who were provided with guidance on standard cleaning procedures based on hospital policy, especially when the testing procedure resulted above 300 RLU. In addition, a weekly report was submitted to the head of patient care assistants, and classroom education was conducted monthly and when required.

Results

A total of 2250 tests were performed, after which 1557 (69.2%) surfaces were identified as well cleaned. The ATP bioluminescence results, in ascending order for test passes, are shown in Table I.

Table I Adenosine triphosphate readings by test point (n=2250)

Location	Number of tests	Adenosine triphosphate reading		Number of passed tests	
		Relative light units	Standard deviation	Number	Percentage (%)
bottom of negative pressure suction basket	150	629.1	327.6	64	42.67
right side of the operating bed base	150	713.38	511.5	73	48.67
Operation room light handle	150	487.63	176.62	85	56.67
middle of the operating mattress	150	437.31	276.56	88	58.67
foot end of the operating mattress	150	390.4	162.63	94	62.67
upper of negative pressure suction basket	150	252.2	252.11	95	63.33
left side of the operating bed base	150	236.5	179.05	98	65.33
Others	287	224.3	167.37	206	71.78
Tray table	150	196.17	119.48	116	77.33
Computer mouse and keyboard	150	134.54	93.4	117	78.00
Ventilator control panel	91	294.11	142.54	72	79.12
Intravenous pump control button	72	144.21	129.38	58	80.56
Procedure trolley	150	128.16	120.58	122	81.33
Aseptic table 2	150	91.83	78.41	134	89.33
Aseptic table 1	150	95.29	58.79	135	90.00

The change in the rate of pass (ATP bioluminescence test result < 300 RLU) of operating room surface per week is shown in Figure I. This reveals general improvement with successive interventions either before the first surgery or after the second surgery.

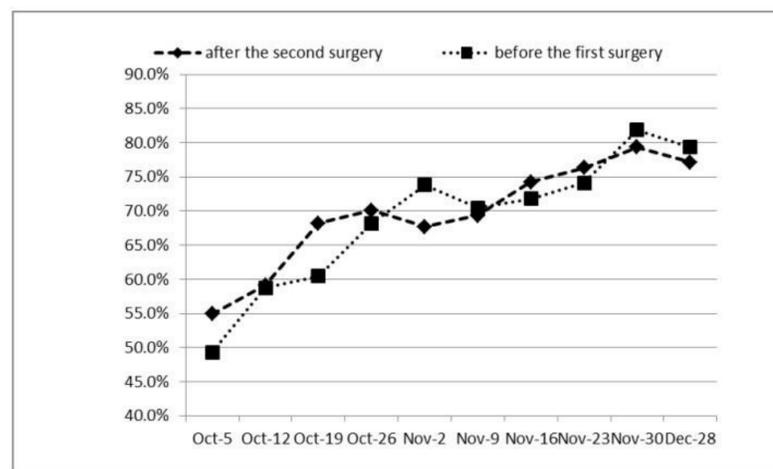


Figure I ATP bioluminescence pass rate in the operating room

Conclusion

Three-month ATP bioluminescence detection of surgical surface cleaning and disinfection levels shows that the average pass rate increased to 78.2% from 52.1%. ATP bioluminescence detection timely on-site feedback makes monitoring simple and convenient. Comprehensive interventions for on-site monitoring, weekly cleanliness quality report and classroom education are effective in improvement environmental cleanliness of the operating room.

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