

Reutilization of Hospital Resources: Using Rapid Decontamination Systems to Recover Patient Supply Waste - Intubation Trays

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At the industry's lowest estimate, waste is 20% of total cost, a staggering number that even dwarfs the annual budget of the US Defense Department. (JAMA, 2012). Innovation, technological advances, and modernization of healthcare have created improved outcomes, but have resulted in an extremely complex system that is mired in waste. Clinical variation, lack of standardization, and lack of a clear vision have created pockets of excellence that co-exist with areas of waste, fraud, and abuse.

Waste can be reduced by avoiding unnecessary services and expenditures. Healthcare presents a unique problem in that over-testing, over-diagnosing and over-treating are considered to be the safer option. In most cases, it is hard to recuperate sunken expenses as the service has already been performed and the equipment associated with that service is rarely reused.

One example of this situation is intubation procedures that provide life-saving treatment to patients experiencing respiratory failure and need ventilator assistance. This procedure requires the utilization of an "intubation tray" that typically includes anywhere from 14-30 components, depending on the type of tray to successfully perform an intubation. In standard practice, the majority of the components are not required, and remain unused and unopened. The usual practice was to discard as waste the entire intubation tray to avoid the potential for cross-contamination. All of the items opened and used, as well as those items unopened and unused, where the medical device remains sterile and only the packaging was handled.

Many approaches to reduce the waste associated with discarding unopened and unused non-sterile supplies have been attempted by other organizations. Notably, Otter et al (2013) produced a one-year study to decontaminate unused medical supplies using hydrogen peroxide vapor that resulted in an annual first-year savings of \$387, 000, from the ICU. However, hydrogen peroxide vapor has an ongoing supply cost, requires off-site treatment, transportation, and specialized personnel to administer the process prior to returning the items to stock. As noted earlier, with modernization healthcare waste changes forms, from wasted money in discarding supplies to wasted money in reprocessing.

Rapid Decontamination using UV-C light has been effective at providing germicidal irradiation and terminating bacterial and viral pathogens in hospital facilities and reducing Hospital Acquired Infections (Napolitano, 2015). Using this same technology in a contained decontamination cabinet, see Figure 1, was hypothesized to provide similar levels of decontamination for medical equipment and a Quality Improvement Project (QIP) was initiated at BayCare Health System to further evaluate this novel technology as a waste-reduction measure.

This study was a prospective analysis on the waste-reduction of intubation trays at Winter Haven Hospital, in the BayCare Healthcare System. The Intubation tray in this study contained 14 different items including 4 different Intubation Blades, Forceps, Suction Kit, Yank Auer, Tube Holder, and a CO2 Detector. The components ranged in cost from \$0.61 to \$12.42, with the total cost of the study tray valued at \$47.41.

Standard procedure prior to this QIP was that unused and unopened medical patient supplies were returned to the sterile processing department to be evaluated for reprocessing. Due to the high risk of pathogens the only way for sterile processing to recover a piece of unused and unopened medical supplies would be to thoroughly wipe down the item's packaging with a disinfectant, wait for it to dry and then enter it back into sterile supply. Even if this process was efficient, the manual disinfection of the typical supply items was not feasible, because of their high volume, their complex shape and structure, and the reliance on the operator to ensure adequate coverage and contact time to achieve a high-level decontamination, IE: The "Human Error" Factor.

The team that worked on this QIP included the following team members, Chief Quality Officer; Project Champion, Vice President of Clinical Excellence, Project Champion, Director of Infection Control, Project Facilitator, Physician Advisor, Process Facilitator, Process Improvement Project Manager, in addition to consultants from Clean Sweep Group Incorporated (CSGI) and TMG Health Technologies.

The Goal of the study was to quantify the potential avoidable cost [resulting patient supply savings] associated with the recovery of unopened and unused intubation trays components within the sterile processing department at Winter Haven Hospital.

The Intervention performed was approximately 30 days between March 20, 2019 to April 23, 2019. Unused and unopened supplies from intubation trays were returned to [SPD] sterile processing where it was identified and quantified using the Medical Recovery Supply App Software. These components were decontaminated to a documented efficacy greater than 99.9% [3.4 Log₁₀] reduction of any potential pathogens, in a single 30 second cycle and returned to /Central Supply. The volume and cost-savings data were captured using systems and software manufactured by TMG Health Technologies.

Twenty-two of the 102 intubation trays, [22%] accounting for 128 components were recovered and reprocessed during the study period. The limited number of returned trays was due to the normal collection policy of the control group. We never announced the program to staff, because we wanted to identify a worse-case current day scenario with limited participation. We are convinced that a defined process implemented department and or facility-wide, would result in a much higher number of trays returned for recovery, and a much greater monthly - supply savings. The fact that this simple 30-day evaluation produced an immediate ROI in the first month, \$685.55 in real supply savings VS the system rental of \$525.00, we are now defining a program for system-wide deployment.

The supply cost-savings of these recovered intubation tray items was \$685.55 or 66% of every tray. Using actual year-over-year Intubation charges per hospital and the qualified numbers from the recent study, we were easily able to qualify a savings estimate of \$9,262 to \$12,630 per facility, given the variance of components reprocessed for Winter Haven Hospital. This cost-savings would be a direct result of the reduced expense for new supplies on intubation tray inventories, a bottom-line impact.. The Recovery Process itself was none factor since multiple products are decontaminated simultaneously in 30 second decontamination cycles, and the operating cost of each cycle is less than a single sanitation wipe.

Figure 2 below illustrates the number of annual intubations per facility in the previous year, the low-end projected recovered [avoided] supply costs "Savings Totals," and the number of months to achieve pay-back if the system was purchased at a cost of approximately \$16,000 versus a monthly rental cost of \$525. The Rental Program gives us immediate savings and a 30-Day ROI.

The team is confident, that with an expanded program to collect unused, unopened patient supplies hospital-wide that a ten percent [10%] supply cost savings on budget could be realized.

Figure 1:

Are actual photos of the Rapid Decontamination Station in the Sterile Processing Department and the box of returned Intubation Tray Supplies available for processing. The Operator first visually checks the returned patient supply product to ensure that it is unopened and confirms the sterility date on the package. Note that the RDS can accommodate multiple items in a single 30 second decontamination cycle.

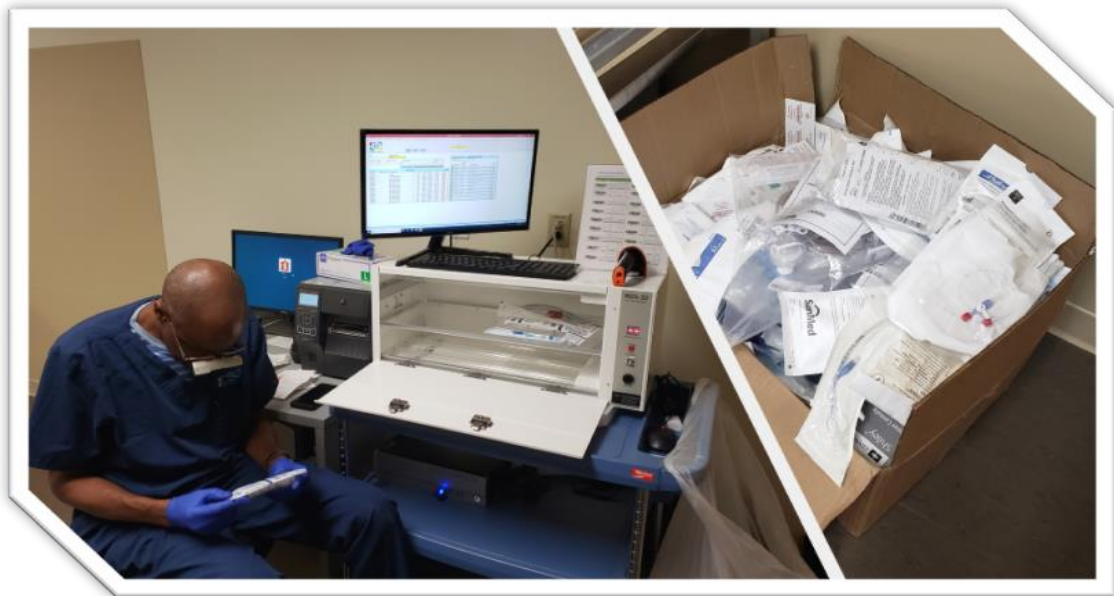


Figure 2:

Note that the Supply Cost Savings and the ROI is calculated on only a 30% compliance. Implementation of the practice hospital-wide, would result in a higher compliance rate, resulting in a much larger patient supply savings, and faster Return on Investment.

Entity Name	ED - ENDOTRACHIAL INTUBATION (4400313)	Respiratory - ENDOTRACHIAL INTUBATION (4560071)	Grand Total	Est. Trays Reprocessed @ 30%	Est. Avoided Cost p/Hospital 30% Reprocessed	ROI (Months)
Bartow Regional Medical Center	41	230	271	81	\$ 3,854.43	49.81
Mease Countryside Hospital	185	231	416	125	\$ 5,916.77	32.45
Mease Dunedin Hospital	57	66	123	37	\$ 1,749.43	109.75
Morton Plant Hospital	242	482	724	217	\$ 10,297.45	18.65
North Bay Hospital	137	122	259	78	\$ 3,683.76	52.12
South Florida Baptist Hospital	149	113	262	79	\$ 3,726.43	51.52
St. Anthonys Hospital	214	357	571	171	\$ 8,121.33	23.64
St. Josephs Hospital	407	317	724	217	\$ 10,297.45	18.65
St. Josephs Hospital North	92	96	188	56	\$ 2,673.92	71.80
St. Josephs Hospital South	103	126	229	69	\$ 3,257.07	58.95
Winter Haven Hospital	496	392	888	266	\$ 12,630.02	15.20
Grand Total	2,123	2,532	4,655	1,397	\$ 66,208.07	N/A

Figure 3:

Barriers and associated solutions to implementing the QIP

CURRENT DAY BARRIER	SOLUTION
Identify the current process owner for product recovery and or reprocessing	Central Supply, Sterile Processing, and Nursing participated for guidance on the current process and challenges associated with Intubation Trays
The equipment needed UV-C Decontamination Station for HLD was not available on site	Consultants provided a standalone Decontamination Station. Hardware, Software and Training was provided for this project
Inability to quantify the Volume and Cost-Savings of the Supplies processed	The Medical Recovery Supply App provided by the Consultants used a Bar-code Scanner to identify each component processed and recovered to calculate the cost-savings by product and dollar cost value
Getting approval from IT to use computer terminal outside the health care system	A standalone turnkey system with PC components was deployed eliminating any network connectivity to the health care system Intranet or Wi-Fi
Unclear of the real projected savings without an annual report on the number and frequency of the intubations by facility	The Hospital Finance Manager provided an annual report detailing the number of billed intubations by type, by month, by cost and by hospital.

Project Leaders:

- Susan Chandler, RN,-BC, MSN, CIC, System Director of Infection Prevention Control; Haseeb Rahman, MD, Physician Advisor, Javier Figueroa MBA, CLSSBB, LBC, Quality Improvement Leader

Consultants:

- WISE CONSULTANTS: Greg Wise, MD, Former VP Medical Affairs and Chief Medical Officer Kettering Adventist Healthcare, Associate Professor of Medicine, Wright State University, and Steve Copper, Account Leader.
- Clean Sweep Group, Inc.
- TMG Health Technologies

Systems and Software Provided By:

TMG Health Technologies

- Rapid Decontamination Station ® MODEL: RDS-32
- Medical Recovery Supply APP ® MRSA - W2019
- Bluetooth Tracking System WBTS- W2019

References

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