

Innovative Use of Electronic Hand Hygiene Monitoring to Control a *Clostridium difficile* cluster on a Hematopoietic Stem Cell Transplant Unit

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Introduction

Issue: Hematopoietic Stem Cell Transplant (HSCT) patients are at a greater risk of acquiring *Clostridium difficile* infections (CDI) due to immunosuppression, biotherapy and chemotherapy treatments. An increase CDI rate on a 32 bed unit in July 2013 prompted the Infection Prevention (IP) team to investigate. The HSCT unit experienced 6 CDIs (infection rate=7.03/ 10,000 patient days) during July 2013 an increase from months prior where the average CDI ranged from 0-1 infections per month.

Project: A component of CDI surveillance evaluated electronic hand hygiene dispenser events and whether an antimicrobial soap or alcohol based hand sanitizer was used. Alcohol sanitizer dispensers were labeled "do not use" in rooms with patients on enteric precautions. Other control measures included monitoring frontline staff compliance with enteric precautions, hand hygiene and equipment disinfection with real time feedback; formal education and ongoing communication of the unit's CDI experience and CHG bathing.

Results: Electronic hand hygiene dispenser activation data revealed staff used alcohol sanitizer 60% of the time and soap and water 40% of the time for CDI patients on enteric precautions. Soap versus sanitizer use for patient on enteric precautions is normally 100% for soap and 0% for sanitizer. Lack of appropriate hand hygiene practices may have contributed to transmission of CDI. Direct hand hygiene observation data revealed decreasing hand hygiene compliance from 96.9% in FY2012 to 77.4% in FY2013. Implementation of control measures resulted in increased hand hygiene compliance to 93.9% and the CDI rate decreased to 2.38/10,000 patient days.

Lesson Learned: Utilizing electronic data that identified the hand cleaning product used facilitated identification an opportunity for improvement related to appropriate product utilization. Communication of these data enabled improvement in the use of the correct product and in overall hand hygiene compliance. Innovative uses of electronic hand hygiene monitoring and ongoing staff communication were contributing factors in reducing CDI on the HSCT unit.

Issue

- Lack of compliance with hand hygiene and the use of soap and water for patients on enteric precautions can contribute to hand to hand transmission of CDI on a nursing unit.
- Hematopoietic Stem Cell Transplant (HSCT) patients are at a greater risk of acquiring *Clostridium difficile* infections (CDI) due to immunosuppression, biotherapy, and chemotherapy treatments.
- Establishing a standardize method for monitoring hand hygiene in a large tertiary facility which includes 1260 beds and over 12,000 employees on 6 campuses can be difficult.
- Utilization of clinical staff for direct observation of hand hygiene requires training and routine validation of hand hygiene observers.
- The data can become skewed with direct observations due to the Hawthorne effect and with electronic monitoring due to staff failing to depress the dispenser lever fully to activate the device which then signals the monitoring system to read each activation.

Project

- Lab-ID CDI patients were placed on a line list and surveillance was done to determine if infections were hospital acquired or community acquired.
- CDI surveillance looked at Lab-ID culture dates, patient location, and medications (i.e antibiotics and proton pump inhibitors).
- Electronic hand hygiene monitoring of Lab-ID CDI patients was utilized to compare soap and water versus alcohol based hand sanitizer data.
- Infection Prevention along with volunteer staff conducted direct observations of frontline staff compliance with enteric precautions, hand hygiene, and equipment disinfection with real time feedback.
- Formal education was also provided at the unit's staff retreat with special emphasis on enteric precautions, hand hygiene and cleaning /disinfection of shared medical equipment (i.e. glucometers, pulse oximetry, and Sure signs vital sign machines).

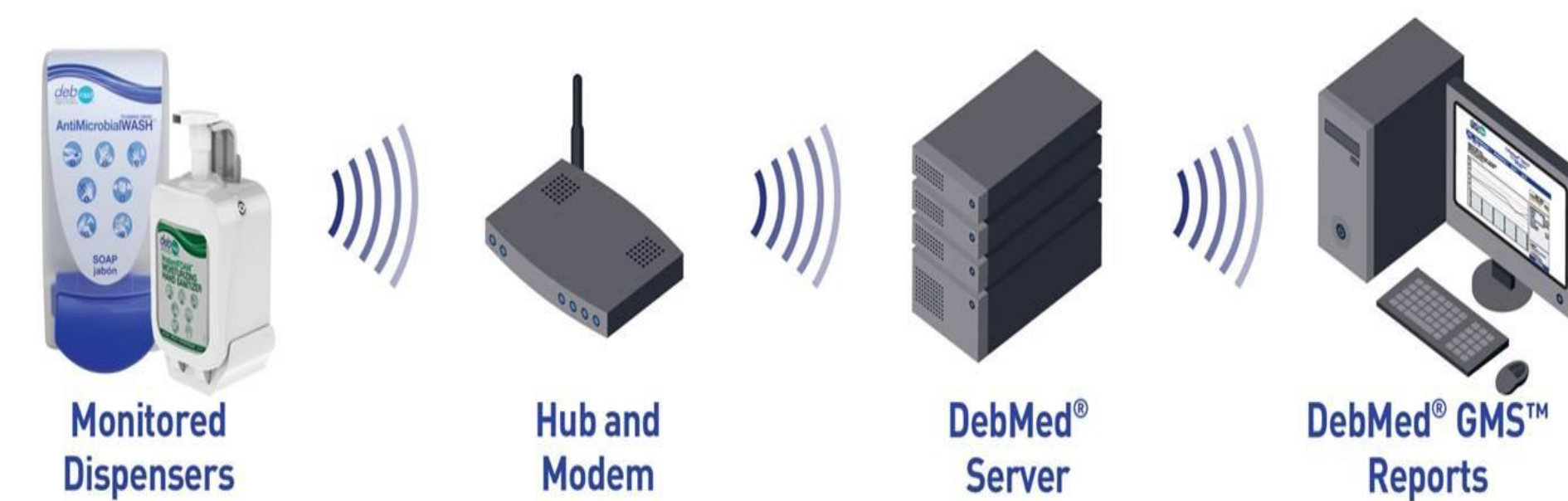
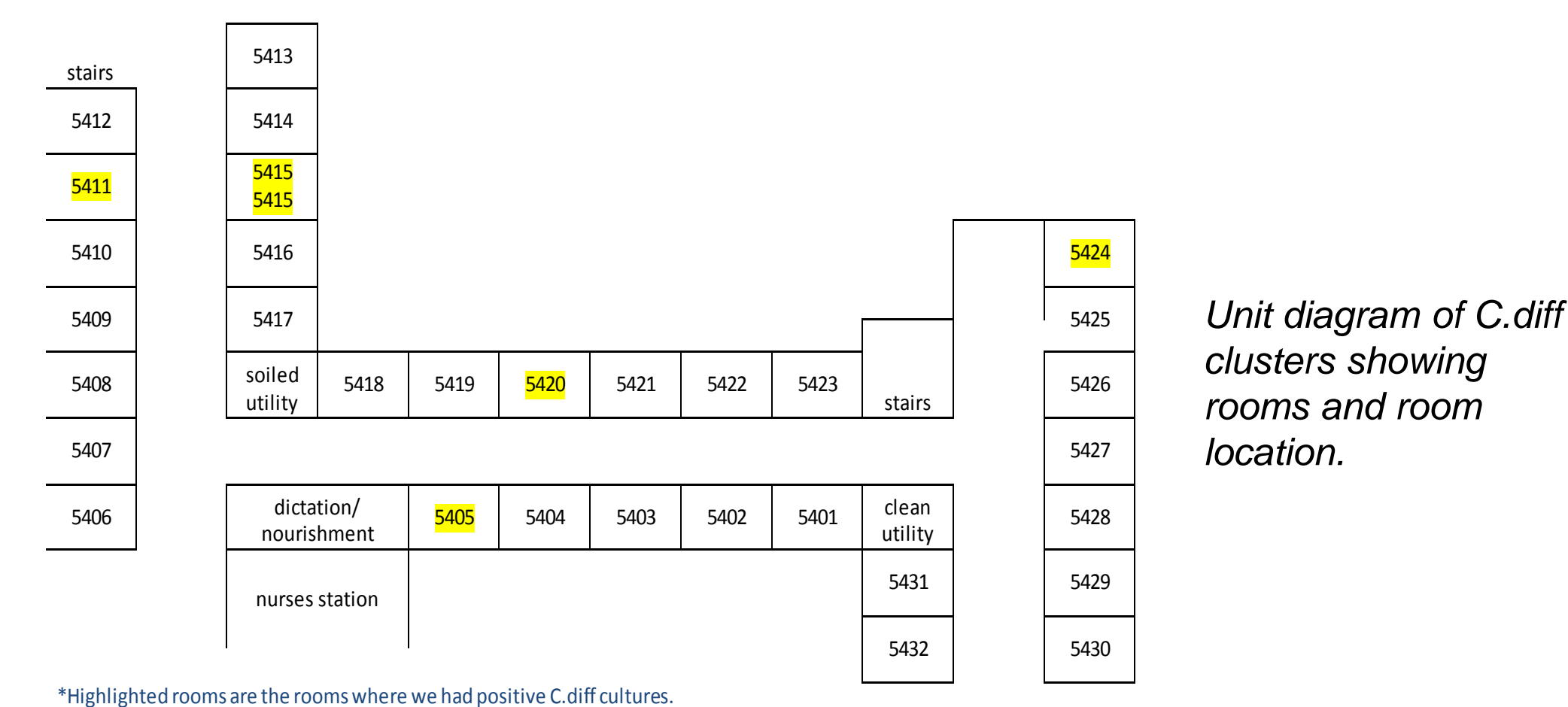
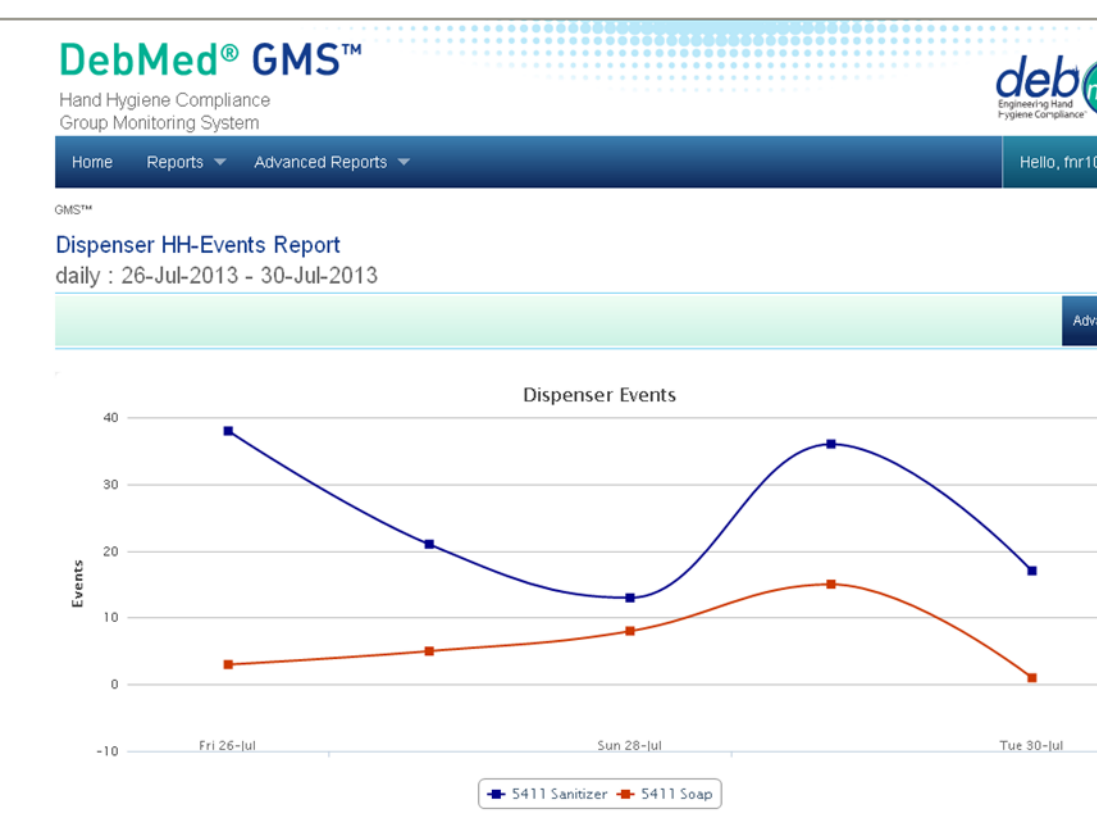
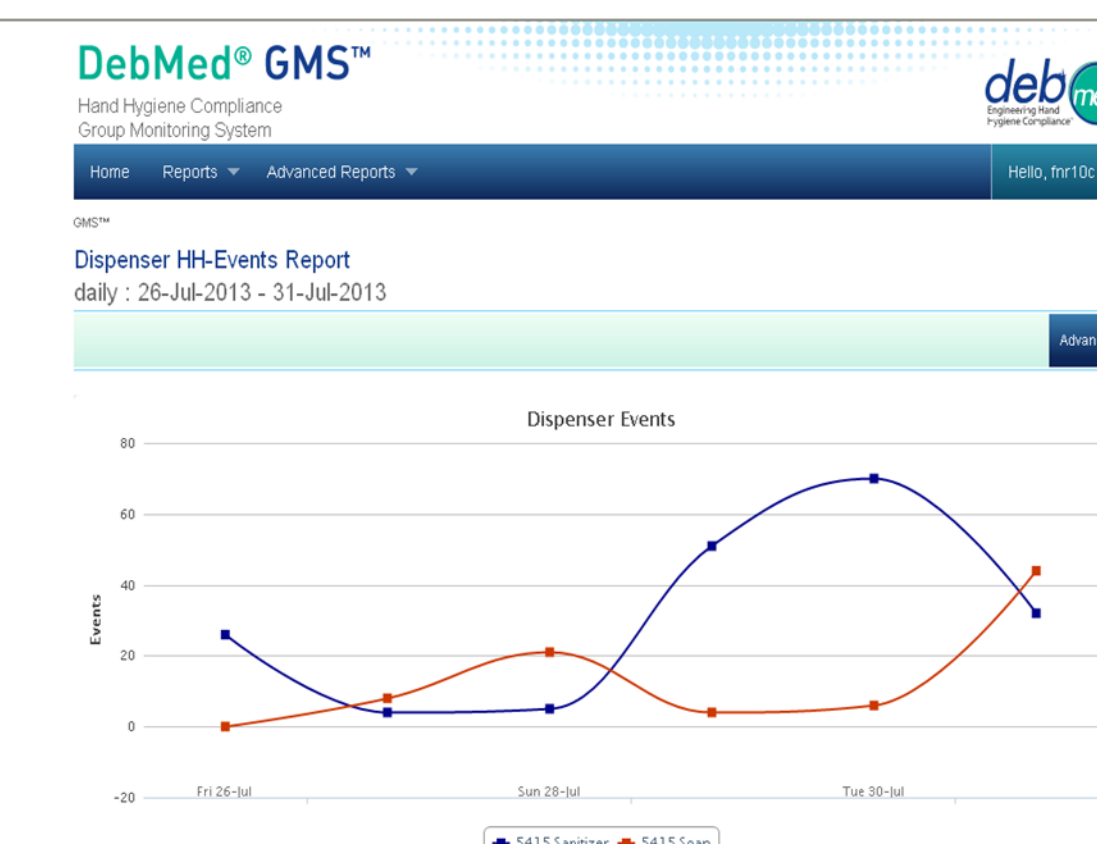


Diagram of the electronic monitoring system showing systematic flow of data being transmitted from the monitored dispensers to the main group monitoring server.

Results

- Electronic hand hygiene dispenser activation data revealed staff used alcohol sanitizer 60% of the time and soap and water 40% of the time for CDI patients on enteric precautions.
- Soap versus sanitizer use for patient on enteric precautions is normally 100% for soap and 0% for sanitizer.
- Direct observations made by infection prevention and volunteers showed inconsistency with hand hygiene, PPE, and disinfection of shared patient care equipment.
- Direct hand hygiene observation data revealed decreasing hand hygiene compliance from 96.9% in FY2012 to 77.4% in FY2013.
- Lack of appropriate hand hygiene practices may have contributed to transmission of CDI.
- Implementation of control measures resulted in increased hand hygiene compliance to 93.9% and the CDI rate decreased to 2.38/10,000 patient days.



Electronic hand hygiene monitoring dispenser reports. The blue line indicates sanitizer activations and the red line soap activations. The sanitizer line for patients on enteric precautions should be a flat line showing soap activations only.

	FY2012	FY2013	After Implementing CDI Control Measures
Hand Hygiene compliance	96.9%	77.4%	93.9%
LAB-ID CDI	0	6	2
CDI RATE	0	7.03	2.38

Table 1. Hand Hygiene Monitoring vs. CDI Rate

Lessons Learned

- Electronic monitoring of hand hygiene can eliminate the Hawthorne effect of direct observation.
- A potential advantage of electronic hand hygiene monitoring is the ability to capture a more accurate number of missed hand hygiene opportunities than direct observation.
- Utilizing electronic monitoring data was instrumental in identifying an opportunity for staff improvement related to appropriate product utilization in patients on enteric precautions.
- Communication with real time feedback on unit variances helped engage staff and improve the overall hand hygiene compliance.
- Innovative uses of electronic hand hygiene monitoring and ongoing staff communication were contributing factors in reducing CDI on the HSCT unit.

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