Solution: Achieving Sustainable Improvements in Hand Hygiene Compliance via a Multi-Component Infection Prevention Program

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IDENTIFICATION:
Medical experts, CDC, and the World Health Organization all agree that hand hygiene (HH) remains our cornerstone intervention for preventing healthcare associated infections (HAIs) and transmission of pathogenic organisms in the healthcare setting. The most common mode of transmission of pathogens in this setting is believed to be via healthcare workers hands. Other reported modes of transmission include contaminated medical devices or equipment, and contaminated environments. Indeed, improved hand hygiene and increased use of alcohol-based rubs have been associated with reductions in HAIs & MDRO transmissions. Pittet et al, reported decreased nosocomial infection rates from 16.9% to 9.9% over a 4 yr period, and reduced MRSA acquisition and infection rates with improved hand hygiene and alcohol-based hand rubs use. Doebbeling et al. reported reduced HAIs by 28% with improved hand hygiene. Guidelines for hand hygiene have been published by the CDC, and WHO and targets for HH compliance have been set by The Joint Commission for hospital accreditation. Unfortunately, adherence to hand hygiene guidelines continues to be poor among healthcare workers. This has also been the case at our hospital. Reported barriers to HH by literature and from our staff included lack of time, work stressors, skepticism about impact of HH on HAI rates, lack of knowledge, lack of role models, and effects of hand cleaning agents on skin.

PROCESS:
Towards protecting patient safety and preventing hospital- associated infections, the Center for Innovations in Quality Patient Care, and department of Hospital Epidemiology and Infection Control at Johns Hopkins Medicine supported development of a comprehensive program to reduce transmission of pathogenic organisms and improve adherence to hand hygiene guidelines. For program planning, we applied a Precede–Proceed framework. (PRECEDE stands for Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation; PROCEED stands for Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development). The framework, which is based on multiple psychological and sociologic theories of behavior change, departs from singular approaches to interventions, towards development of comprehensive interventions that address the physical and social environment as well as individuals’ knowledge, perceptions, attitudes and beliefs. We brainstormed with relevant stakeholders environmental requirements, and predisposing, enabling, and reinforcing factors needed to improve healthcare workers adoption of the following three target behaviors: Clean hands per guidelines, remind other colleagues to clean hands, and follow isolation policies. Predisposing factors included having a social environment that is intolerant to poor hand hygiene; reinforcing factors included positive and negative reinforcement of provider behaviors via reminders from colleagues and direct feedback from unit
leadership; enabling factors included availability of clear, concise and accessible educational materials, and conveniently located hand sanitizer dispensers.

**SOLUTION:**

Our program included the following educational and organizational components:

1. Educational tools including online multidisciplinary training, videos, and Jeopardy games on HAI and MDRO transmission prevention
2. Public communication campaign using multiple communication channels including posters, isolation signs, banners, and screensavers
3. Convenient placement of hand sanitizer dispensers and reliable refill strategy
4. High level leadership engagement with inclusion of leadership figures on public communication materials, and letters from institutional leadership setting hand hygiene as an institutional priority
5. Regular feedback on HH compliance – Measurement method based on direct observations of hand hygiene and adherence to isolation policies; Standardized online training for undercover observers; Online monthly data reporting tool with customizable (drill down) capability to generate reports on HH compliance at the department and unit levels by healthcare provider type; Data transparency to all employees and leaders at institution
6. Unit and Service Leadership guide and Toolkit
7. Recognition of top performing units and individuals

Implementation occurred in multiple stages as development of various program components got completed and stakeholder agreement on implementation was achieved. Implementation started in early November 2007 with institution wide hand sanitizer dispenser placement, a public communications campaign, and multidisciplinary online educational materials and Jeopardy games all promoting multidisciplinary engagement from leadership and frontline providers and a comprehensive strategy for preventing hospital associated infections abbreviated by the acronym WIPES:

- **W** Wash/clean hands
- **I** Identify and isolate early
- **P** Precautions use (use gowns, gloves, and masks)
- **E** Environment kept clean
- **S** Share the commitment, raise your hand

Monthly reporting of HH compliance data by unit to high-level leadership started in January 2008. Campaign messages were refreshed in March 2008 and again in mid-January 2009. Online customized data reporting (accessible to all leadership and frontline providers) and institutional leadership feedback to high and low performing units followed by the end of September 2008 together with the release of a leadership support toolkit that offers unit level leaders concrete steps to promoting hand hygiene on their units.

**Program Evaluation Plan and Results:**
Following our program framework, we defined impact and outcome measures to evaluate our program’s success. Program impact measures include HH compliance and Purell consumption in ml per 1000 patient-days. Outcome measures include transmissions of Methicillin-resistant Staph aureus (MRSA) and Vancomycin resistant Enterococcus (VRE) in select hospital units that have ongoing surveillance programs. Hand hygiene compliance is calculated as percentage of HH episodes divided by total number of conducted observations. A HH episode is defined as anytime a provider uses alcohol-based hand rub or washes hands with soap and water upon entry or exit from a patient environment. In a private or semi-private room, the patient environment is defined by its walls. In a multi-patient room the boundaries are defined by the adjacent walls and the ‘curtain line’. HH observations are conducted on ongoing basis on all inpatient units aiming at a minimum of 40 observations per unit per month. Observations are conducted by ‘undercover’ observers from various disciplines who have completed a standardized online training and passed an online test requiring them to record observations on 15-videotaped clinical scenarios with a passing grade of 90%.

Since starting this program, Johns Hopkins hospital has seen a three fold increase in its average hand hygiene compliance, rising from 21% in October 2007 to 66% in January 2009 (p= 0.000). There was a similar three-fold increase in alcohol-based hand rub consumption from 15.6 L per 1000 patient-days in October 2007 to 44.5 L per 1000 patient-days in December 2008. HH compliance has increased among all units and across all healthcare worker categories including those for nursing, physicians and environmental services staff. The nurses’ category compliance increased from 24% in October 2007 to 72% in January 2009 (p= 0.000), the physicians’ increased from 24% to 57% (p= 0.000), and the environmental services staff increased from 12% to 69% (p= 0.002).

Mobilization of leadership at all levels has been crucial to our success. Data transparency across all units and departments and feedback on performance from institutional leadership helped maintain unit leaders focus on achieving significant and sustainable improvements. In addition, motivating unit leaders with frequent feedback and recognition opportunities, while empowering them with implementation tools and authority to innovate and create local interventions led to emergence of strong advocates for hand hygiene from all disciplines at the unit level and a continued stream of fresh ideas. Aiming at continued improvement of HH compliance on their units, many unit leaders have started local interventions using various approaches such as poster ideas, patient involvement, verbal and non-verbal reminders from colleagues, local leadership feedback, publicly displayed messages on individual provider performance, etc. Departments also started offering prizes for their highest performing units. Current plan to ensure sustainability include continued recognition of top individual and team performance, support to units, providing forums for exchanging lessons learned, continued measurement and feedback, and refreshment of campaign messages.