Laying the Foundation for Better Infection Prevention and Control Practices Through Active Learning in Early Medical Education

Theresa Madeline, MD, Priya Nori, MD, Adebisi Adeeye, RN, BSN, MPH, CIC2 and Belinda Ostrowsky, MD, MPH, FIDSA, FSHEA1, 2

1. Department of Medicine, Division of Infectious Diseases, Albert Einstein College of Medicine and Montefiore Medical Center, Bronx, NY
2. Infection Prevention and Control Department, Montefiore Medical Center, Bronx, NY

Abstract
Background: Hospital acquired infections (HAI) are a major cause of morbidity, mortality, and excess cost in the US. Studies have shown poor infection prevention and control (IPC) knowledge, skills, and attitudes among students entering medical school, and this may contribute to the high incidence of HAIs and nosocomial infections.

Methods: All second year medical students at Albert Einstein College of Medicine participated in a two and half hour Quality Improvement and Safety session as part of the Clinical Skills Course, moderated by IPC and Infectious Diseases faculty. The session included an interactive learning module, providing an overview of infection control principles and prevention strategies. Students also had an opportunity to provide their personal perspective (PPE) for different clinical scenarios and performed hands-on hygiene using UV reactive wash (Glo GermSM) to identify areas for improvement. Students also had HAI toolkits comprised of recommendations from the CDC, professional society and local guidelines in a small hands-on learning exercise to identify high-risk IPC areas. A second year IPC faculty member provided local information, resources on PPE and HAI prevention. IPC questions were incorporated into the course final examination.

Results
185 students participated in the session; 75 completed an online survey.

Survey comments revealed:
- Desire to incorporate IPC into the curriculum
- Positive attitude toward active learning modalities such as donning and doffing of PPE and handwashing
- 88% of surveyed students rated the session on PPE and handwashing as ‘Effective’ or ‘Very Effective’ in achieving learning objectives.

Many students requested additional practice in the following areas prior to beginning the clerkship: hand hygiene, donning and doffing of PPE, handwashing, and safe disposal of sharps.

Summary and Future Directions
- An active team-based learning curriculum is an effective and acceptable model for integrating IPC into medical education.
- Expansion of the curriculum to include environmental cleaning, safe handling of sharps, and decontamination.
- To assess the long-term impact of IPC curriculum on future practice and encourage knowledge retention, students will complete a survey and receive a brief refresher IPC session in the third and fourth years.
- IPC materials will be incorporated into a smartphone app for use during the clinical clerkships.

Methods
- Setting: Albert Einstein College of Medicine Clinical Skills Center
- Timing: Second year Microbiology and Infectious Diseases Course
- Duration: 2.5 hour session

Intervention:
- Quality Improvement and Safety active team-based learning session
- Small groups of students rotated through 3 IPC stations

Isolation and PPE
- Identify appropriate isolation procedures for clinical scenarios
- Donning and doffing of PPE
- Hand Hygiene
- Perform hand hygiene after applying UV-reactive manual hand wash (Glo Germ) to identify areas for improvement (Figures 2A and 2B)

IPC toolkits:
- Use bundles derived from CDC, professional societies, and local guidelines to address IPC cases in teams

IPC resources on PPE and HAI prevention were distributed.

Outcomes
- IPC questions were included in the final Microbiology and Infectious Diseases examination.
- Students completed an anonymous online survey about their experience and attitudes about the curriculum.

Selected Student Survey Comments
- “Longer session for donning and doffing PPE! Allow all students to practice for themselves. Demonstrate proper techniques for disposing of hazardous materials, such as sharps/needles, to show us how to prevent injury for patients and us.”
- “I think that it was INCREDIBLY useful information - practical stuff that we wouldn’t really learn otherwise.”
- “I think it helped piece together what was appropriate for the various conditions. It is one thing to study these things on paper throughout the duration, but to know the specifics of the actual application of these techniques can be overlooked.”
- “It was smart to actually have us “suit up” with the PPE; easier to remember when we see it than just hear about it.”
- “The sessions were very engaging. Taking students out of a lecture environment and into an interactive one makes for a more enjoyable learning experience.”
- “This summer I shadowed an OR/GYN and had no idea how to put on gloves, gowns, go into sterile areas, and follow pretty much anything. PPE surrounding normal surgeries would also be helpful, e.g. what size surgical gloves to choose, how many gloves, sterile gowns, sterile field, etc. I appreciated the thought that the small group leaders put into the sessions and that they were interactive.”
- “This is extremely important in my opinion and nobody has taught us how to gown before entering an isolation room.”

References
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