EXTERMINATOR EXTRAORDINAIRE

Kathryn Hawkins, William L. Winters, Jr.
From Methodist DeBakey Heart & Vascular Center, Houston, Texas

There is an old saying about things that matter: "The devil is in the details," or, perhaps more aptly, "It's the little things that count." This is especially true in hospitals, where the linle things frequently do cause the most trouble. By litde, I mean microscopic. In coday's hospital environment, that translates most commonly into methicillin-resistant *Staphylococcus* aureus bacterial infections, although the prevalence of other antibiotic-resistant bacteria is mcreasmg.

Patient safety programs are commonly oriented toward systems to protect patients from errors. In the case of hospital infections, however, the root cause of system failure to prevent infections more often lies with the individual involved in patient care - the factor of personal accountabili$_{ty}$ succinctly outlined by D. Goldman, M.D., in a 2006 *New Englandjournal ofMedicine* editorial.1 Pleading for an increase in personal accountability to accompany system improvements, Goldman relates a comparable environment in which cleanliness is paramount. In computer-chip manufacturing, workers who enter "clean rooms" (i.e., a patient room) are required to wear special suits, masks and gloves to prevent chip contamination. Failure to follow these procedures brings a warning, and subsequent failures lead to disciplinary action. Should we expect less in the care of humans? The systems we develop give caregivers the knowledge, tools, and time to follow a hygiene regimen. If th$_{ey}$ do not use the regimen every time it is required, ic is not the system's fault.

With that in mind, in 2003 the Infection Control Department at The Methodist Hospital (TMH) declared war on those nasty little microbes responsible for intensive care infections, cardiovascular wound infections, central line associated blood stream infections (CLABSI) and ventilator-associated pneumonia (VAP). Surveillance of infection rares in rhe intensive care units has been routine for years, but when data revealed an increase in infection rares continuously exceeding national bench marks, an action team was assembled. This ream included the hospital epidemiologist, infection control professionals, ICU physician intensivists, respiratory care staff, catheter care nurses, and unit management personnel.

Their primary approach ro the infection problem began with the recognition and reaffirmation rhar hand hygiene (HH) was of paramount imporcance. Dr. Goldman reminded us that hospital infections are transmitted primarily by health care providers whose hands may have touched literally dozens of innocent looking bur highly contaminated objects in the patient's environment. Stool, sputum, skin, and room objects all may be heavily contaminated, not to speak of the caregiver's own bacterial residents. Proper HH is widely recognized as the most simple and effective strategy for preventing infection transm1ss'10n.

To gauge the proper use and frequency of HH procedures at TMH, a self-auditing process of hand hygiene practice was begun in 2004. The hospital's Infection Control Department devel-

Table 1. Infection Control Department developed a data collection tool

Hand Hygiene Monitor Instructions for Self Audits:

1. Read indications for hand hygiene.
2. Count each time an indication comes along and make a hash mark in "indications" column for the appropriate discipline.
3. If the person cleans hands, make a hash mark in yes column in appropriate area: hand gel or soap & water.
4. Provide the results to your staff.

Nurses *(Nurses include RNs, LVNs, PCAs)*		**Physician** *(Physicians include Fellows, Residents, PAs)*		**Ancillary Staff** *(Ancillary staff inc... X-ray, EKG, re... PT, dietary, etc.)*	
Indications	YES	Indications	YES	Indications	YES
	Soap& Water		Soap& Water		Soap & Water
	Hand Gel		Hand Gel		Hand Gel

Table 2. When to sanitize

Clinical

- Before beginning any patient care activity involving direct contact with the patient
- Before inserting an invasive device such as an IV or a Foley catheter
- After removal of any protective equipment, especially gloves
- Before and after completing any patient care activity, even as simple as taking a blood pressure

Non-Clinical

- After touching contaminated surfaces or equipment in the patient's environment
- After using the computer (keyboards can be contaminated)
- After using the restroom
- Before touching your face or eyes
- After coughing or sneezing

Encourage families/visitors to sanitize before and after visiting

Table 3. FAQ: Hand Hygiene Absolutely

Q:	**Why is hand hygiene so important?**
A:	It is the easiest way for germs to be carried - on warm moist hands - to a susceptible patient. Hand hygiene also protects the health care worker.
Q:	**What is the proper way to use the alcohol gel?**
A:	Dispense a nickel-size amount of Purell onto the palm of your hand Cover all surfaces of your hands **with** the gel. Rub your hands together briskly until dry (-15 seconds).
Q:	**What is the proper way to wash hands?**
A:	Wet hands and apply soap - at least a quarter-size amount Scrub hands vigorously for 10-15 seconds (sing the birthday song - even if it's not your birthday). Thoroughly rinse hands with water flowing from wrists to finger tips Dry hands Use paper towels to turn off the water.
Q:	**How often can I use the alcohol gel?**
A:	The gel can be used as often as you wish. Soap/water is required when hands are visibly soiled.
Q:	**How are the anonymous observations for hand hygiene performed?**
A:	Each unit has a total of 10 observations each month divided into three groups: nursing staff (RNs, LVNs, PCAs), physicians (residents, fellows), and ancillary staff (radiology, respiratory therapy, PT, etc). An observation requires two parts: 1) indication for hand hygiene observed, e.g., gloves being removed, and 2) hands actually sanitized (alcohol gel or soap/water). The rate is calculated as a percent (number of times sanitized per number of indications).

oped a data collection cool (Table 1) **and** provided education and instruction on proper data collection co all patient care units (Table 2). Using the protocol, compliance rates were determined by dividing the number of rimes hands were actually sanitized by the number of opportunities to do so and reported as a percent. The overall compliance rate in 2004 was found to vary between 40 and 73%.

In 2005, co supplement che effectiveness of hand washing, Purell hand sanimzers were placed extensively throughout the hospital. Purell is an antimicrobial agent consisting of 62% ethyl alcohol. The boccie label describes ic as an "instant hand sanitizer with moisturizer and vitamin E." Dispensers for Purell are now strategically located all around the hospital. restrooms, patient rooms, nursing stations, and at elevators. Instructions for its use are widely dispersed (Table 3), and there is one dispenser in view from virtually any location in the hospital.

The effects of this initiative on a variety of hospital infection statistics are scaggering.

- Figure 1 presents hand hygiene compliance rates among the nursing staff, physicians, and ancillary staff; in July 2007, the compliance rates had reached 94%. These data are all anonymous observations - provided by an outside consulting firm of infection control professionals - char began in March 2005 per the protocol established.
- Figure 2 presents hand hygiene compliance rates versus the frequency of hospital-acquired, vancomycin-resistant enterococcal infections. The steep decrease in VRE infections mirrors the concomitant increase in HH.
- Table 4 illustrates the reduction in central line-related infections per 1000 line days from 2003 through 2006.
- In Table 5, the surgical wound infection rates for cardiovascular surgical procedures (including cardiac and

Figure 1. Hand Hygiene Compliance: Anonymous Observations

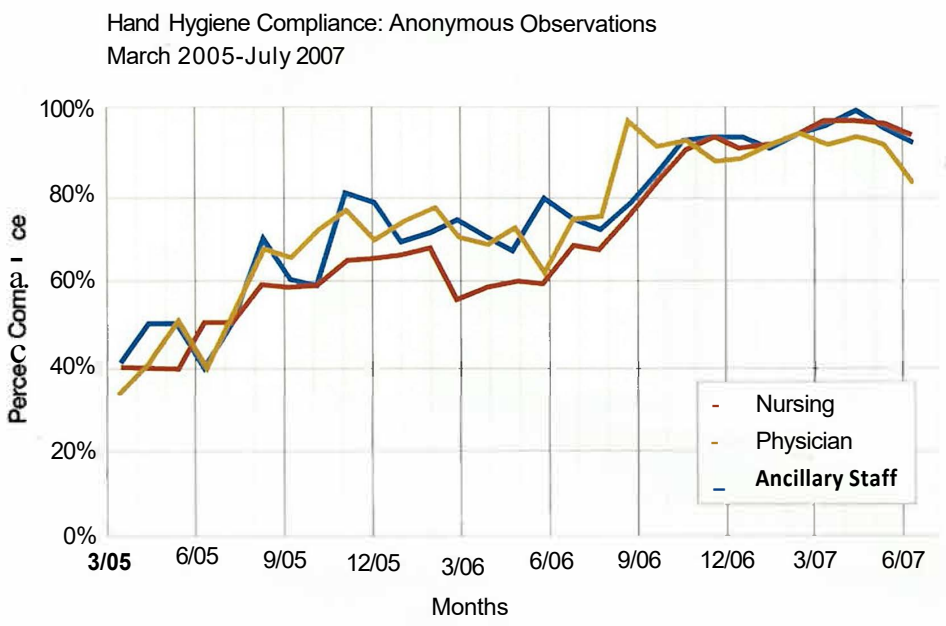
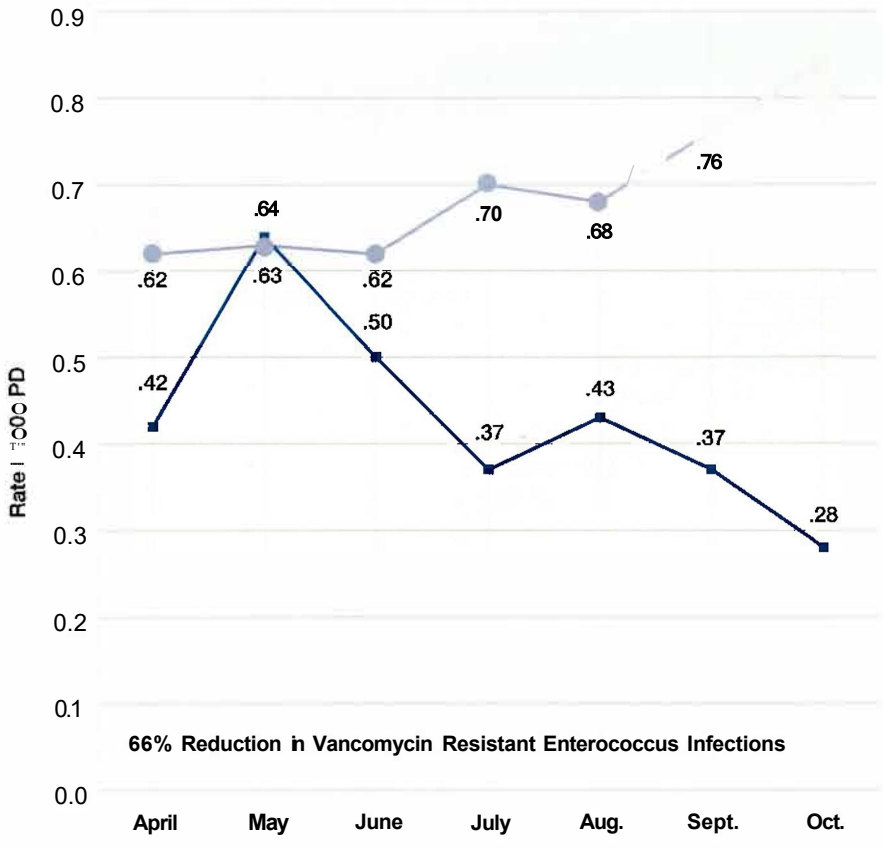


Figure 2. HA-VRE April - October 2006



vascular procedures) as a percent of infections per number of procedures for 2004 through 2006 are presented as a percent reduction from baseline.

- In Table 6, the dramatic eliminarion of cardiovascular ICU ventilator-associated pneumonia is illustrated through March 2006.

These asconishing outcomes are che result of an intensive education campaign, directed co all patient care providers, about the appropriate use of hand washing and Purell hand sanitizer.

Hospitals are a notorious breeding ground for acquired infections. In Britain, methicillin-resiscant Staphylococcus aureus is reported co account for more than 40 % ofin-hospical blood infections. Scarring in 2008, in an effort to reduce or stop the spread of hospital-borne infections, hospitals in England will ban the wearing of neckties, long-sleeve shires, jewelry (including watches), artificial nails and white coats. Ties are worn daily but rarely laundered. In 2004, a New York hospital study of neckties found char nearly half harbored ac lease one species of infectious bacteria. Thus far, co our knowledge, dress code restrictions for doctors and other hospital personnel have nor been recommended in chis coumry, bur the Centers for Disease Control and Prevention advises chat chose who do not adequately wash their hands pose a far greater risk co patients chan those who do. They also advise against che use of artificial nails in operating rooms as they have been found co carry more germs than natural nails, both before and after washing.

There are many facets ro the issue of providing quality care in a hospital setting. The race of hospital-acquired infection is a major one - nor only from the standpoint of che patient's health bur also from thac of the hospital's financial health, since Medicare is preparing to stop paying for treatment of hospital infections that are considered preventable. That che issue of hospital infeccio s can be addressed in

an exrraordinarily effective manner has been well demonstrated by Methodist's Infection Prevention and Control department and all of the hospital scaff and physicians. They have shown the way. The challenge now is to sustain chis progress.

REFERENCES

1. *Goldmann D. System failure versus personal accountability - the case for clean hands. N Engl J Med. 2006;355:12U23.*

Table 4. Reduction in Central Line Related Infections Per 1,000 Line Days

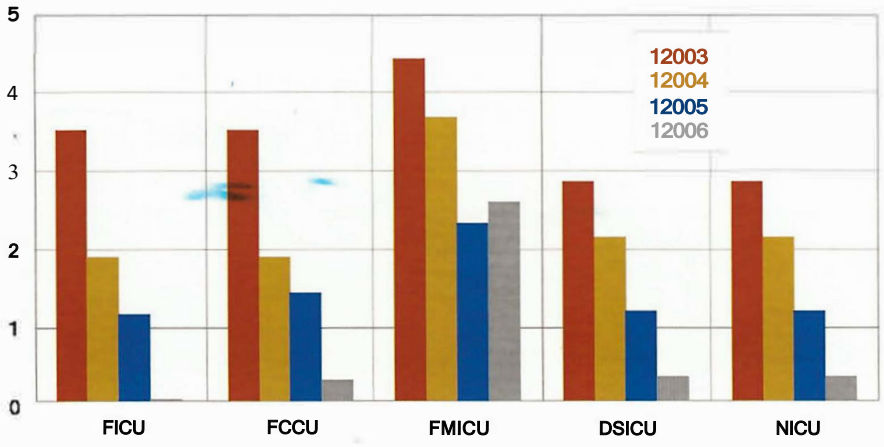


Table 5. Surgical Wound Rates in Cardiovascular Sugical Proceedures

Percent Reduction in Cardiovascular Surgery Wound Infection Rates (includes cardiac and vascular procedures)			
2004	**2005**	**2006**	**2007 (May)**
Baseline	**52**	59	97.8*

* Through May 2007, 7 infections in 959 procedures for a 0.7% infection rate, a 97.8% reduction from baseline.

Table 6. CVICU Ventilator-Associated Pneumonia 2003-2007

CVICU Ventilator-Associated Pneumonia 2003-2007 Percent Reduction Per Year from Baseline				
July 2003	**July2004**	**July 2005**	**July2006**	**July 2007**
Baseline	89%	100%	99%	97%