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Use patient safety furor as opportunity to educate public on infection control

Only one-third of infections are preventable

Fueled by a recent Institute of Medicine report on medical errors, the nation's burgeoning patient safety movement should look to infection control as an epidemiologically proven model that can be applied to tracking and preventing medical errors and non-infectious adverse outcomes, ICPs emphasize. While presenting possible opportunities for ICPs, the highly publicized IOM report also raises concerns that nosocomial infections may be increasingly viewed as "preventable errors" despite spiraling inpatient acuity and the ubiquitous use of invasive devices.

"There is an unspoken assumption [in the IOM report] that these hazards ought to eliminated," says **William Schaffner**, MD, chairman of the department of preventive medicine at Vanderbilt University in Nashville, TN. "That is an untutored, unrealistic concept. There are clearly some hospital-acquired infections that are going to occur. The realistic charge is to keep the occurrence of nosocomial infections to the smallest rate that can be reasonably achieved within the resources allotted."

Projecting that between 44,000 to 98,000 patient deaths may occur annually due to medical errors, the report by the Washington, DC-based IOM calls for Congress to establish a national patient safety center and require reporting of adverse events by states.[1] **(See report recommendations, p. 19.)** Whether such reporting systems would include

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COMING IN FUTURE ISSUES

- **New U.S. adenovirus strain:** A strain of adenovirus linked to outbreaks in the U.S. was previously reported in Israel
- **HCV in dialysis centers:** Bloodborne pathogen poses risk to patients and staff
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nosocomial infections remains to be seen, particularly because the primary focus and subsequent discussion of the report have dealt with medication errors. However, the IOM report cited "hospital-acquired or other treatment-related infections" by way of example along with transfusion errors and adverse drug events; wrong-site surgery and surgical injuries; preventable suicides; restraint-related injuries or deaths; and falls, burns, pressure ulcers, and mistaken patient identity.

President Clinton directed a health quality task force to assess ways to implement the recommendations and report back to Vice President Gore in mid-February. Given the resources, ICPs have the expertise to help in fulfilling many of the IOM recommendations throughout the health care system, including tracking and preventing such non-infectious adverse outcomes as medication errors.

"Whatever group they set up at the national level would be extremely well-advised to go to the infection control community for expertise in epidemiology, surveillance, analytical techniques, definitions of problems, crafting of solutions, and long experience within the system to improve quality," Schaffner says. "But locally, much depends on how resources are allocated. I would not wish infection control programs to be given more responsibility without commensurate resources."

Still, by drawing national media attention and a presidential press conference, the IOM report may well put patient safety issues on the "front burner," adds **Fran Slater**, RN, MBA, CIC, CPHQ, manager of infection prevention at Methodist Hospital in Houston. That could present opportunities to underscore the importance of infection control as well as opening avenues for ICPs to become involved in other patient safety issues, she says. "Granted, the whole emphasis of this particular report had to do with errors," she says. "However, if you look at patient safety in a much broader context, then certainly it applies to infection prevention and control programs. I see some possibilities for infection control to hop on this bandwagon. There are opportunities here for our profession. ICPs should be part of whatever team the hospital puts into place to improve patient safety."

While emphasizing that it is important not to dilute the primary clinical mission of infection control programs, an epidemiologist with the Centers for Disease Control and Prevention adds that ICP expertise is certainly applicable to non-infectious

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IOM calls on Congress to act on medical errors

National center, state reporting urged

In drawing national attention to the problem of patient safety and medical errors, the Institute of Medicine in Washington, DC, issued specific recommendations, which are summarized as follows:[1]

• Congress should create a Center for Patient Safety within the Agency for Health Care Policy and Research in Washington, DC. This center should set the national goals for patient safety, track progress in meeting these goals, and issue an annual report to the president and Congress on patient safety. The center should develop knowledge and understanding of errors in health care by developing a research agenda, funding centers of excellence, evaluating methods for identifying and preventing errors, and funding dissemination and communication activities to improve patient safety.

• A nationwide mandatory reporting system should be established that provides for the collection of standardized information by state governments about adverse events that result in death or serious harm. Reporting should initially be required of hospitals and eventually be required of other institutional and ambulatory care delivery settings. Congress should designate the Forum for Health Care Quality Measurement and Reporting as the entity responsible for promulgating and maintaining a core set of reporting standards to be used by states, including a nomenclature and taxonomy for reporting. Congress should also provide funds and technical expertise for state governments to establish or adapt their current error reporting systems to collect the standardized information, analyze it and conduct follow-up action as needed with health care organizations.

• The development of voluntary reporting efforts should be encouraged. The Center for Patient Safety should describe and disseminate information on external voluntary reporting programs to encourage greater participation in them and track the development of new reporting systems as they form. The center should convene sponsors and users of external reporting systems to evaluate what works and what does not work well in the programs, and ways to make them more effective. The center should fund and evaluate pilot projects for reporting systems, both within individual health care organizations and collaborative efforts among facilities.

• Congress should pass legislation to extend peer review protections to data related to patient safety and quality improvement that are collected and analyzed by health care organizations for internal use or shared with others solely for purposes of improving safety and quality.

• Performance standards and expectations for health care organizations should focus greater attention on patient safety. Regulators and accreditors should require health care organizations to implement meaningful patient safety programs with defined executive responsibility. Public and private purchasers should provide incentives to health care organizations to demonstrate continuous improvement in patient safety. Health professional licensing bodies should implement periodic re-examinations and relicensing of doctors, nurses, and other key providers, based on both competence and knowledge of safety practices. Professional societies should make a visible commitment to patient safety by establishing a permanent committee dedicated to safety improvement.

• The Food and Drug Administration should increase attention to the safe use of drugs by developing and enforcing standards for the design of drug packaging and labeling that will maximize safety in use. The FDA should require pharmaceutical companies to test proposed drug names to identify and remedy potential sound-alike and look-alike confusion with existing drugs.

• Health care organizations should make continually improving patient safety a declared and serious aim by establishing patient safety programs with defined executive responsibility. Patient safety programs should implement nonpunitive systems for reporting and analyzing errors within their organizations.

Reference

1. Institute of Medicine Committee on Quality of Health Care in America. *To Err is Human: Building a Safer Health System*. Washington, DC: National Academy Press; 1999. ■

outcomes like medication errors. Applicable infection control approaches include establishing surveillance, defining populations, and using rates to benchmark and trigger interventions, says **Robert Gaynes**, MD, chief of nosocomial infection surveillance activity in the CDC hospital infections program. Multidisciplinary interventions across a broad range of practices are typically required to reduce infection rates, because only about 10% of nosocomial infections occur in clustered outbreaks, he says.

"ICPs could actively participate in developing a multidisciplinary, targeted approach for other adverse events in hospitals using the model that has been developed in the field over the last 10 years or so," he says. "We have found that when there have been significant [infection] rate reductions, it has been through using multidisciplinary teams. When there is an outbreak, often one thing has gone wrong, and when you correct the situation it returns to baseline. Whereas in [ongoing] surveillance, if you find by benchmarking that a rate is high, very often you cannot target a single intervention. You have to look at multiple interventions with multiple people."

Indeed, ICPs have to move from "outbreak thinking" to address broader patient safety issues, says **Donald Berwick**, MD, one of the IOM committee members who wrote the report, and president of the Institute for Healthcare Improvement in Boston. "I think it is a great thing for them to get invested in," he says. "[But] we are not talking about some background rate that is acceptable and we are watching for outbreaks of either infections or medication errors. The idea behind the report is that the prevailing rates — the background rates —- are unacceptably high, and therefore the agenda is not simply control of spikes. It is a continuous reduction in prevailing rates."

Hand-washing failures preventable?

While the report focused primarily on medication errors and other non-infectious adverse outcomes, the IOM also noted that some nosocomial infections result from preventable errors of execution (i.e., failure to wash hands.) "For example, if a patient has surgery and dies from pneumonia he or she got postoperatively, it is an adverse event," the IOM report states. "If analysis of the case reveals that the patient got pneumonia because of poor hand washing or instrument cleaning techniques by staff, the adverse event was preventable (attributable to an error of execution)."

The IOM report cites that "2 million cases of nosocomial infection occur each year. . . . Epidemiological studies have estimated that one-third of nosocomial infections can be prevented by well-organized infection control programs, yet only 6% to 9% are actually prevented." While the bulk of the IOM report did not focus on nosocomial infections, future reports may deal in more detail with the issue, Berwick adds. "With a hospital-acquired infection, to regard any of them as inevitable is not modern thinking," he says. "So the whole idea is to take the currently non-preventable [infections] and make them preventable by understanding them more. That is not in the current IOM report, but it is in the domain of quality. This is only the first in a series of reports by the IOM. I'm sure we'll be speaking to issues like that [in upcoming reports]."

Yet while historic problems with hand-washing compliance are a continual source of frustration for ICPs, many nosocomial infections today are a trade-off for keeping very sick patients alive with invasive devices, Gaynes says. "That is where nosocomial infections or other health-care related infections may diverge a bit from medication errors," he says. "From all evidence that I have seen, nosocomial infections have a degree of preventability, but they are not always preventable — particularly when they revolve, as most do, around invasive devices. They may be the price we pay for inserting these life-saving invasive devices. You are bypassing host defense mechanisms when you put a patient on a ventilator or a central venous catheter."

Indeed, Schaffner argues that infection control was not given sufficient credit in the IOM report for preventing infections in the face of adverse conditions such as increasing severity of inpatient illness and nursing staff reductions under managed care. "One of the first things that gets cut by a busy health care worker attending to sick patients is the mundane, repetitive aspects of infection control such as hand washing," Schaffner says. "And even if 95% of the activities at the bedside are done according to infection control standards, if at 2 o'clock Saturday morning infection control is not attended to, the organism can completely move from patient A to patient B. It's not a dose-related phenomenon. You can get complete cross-transmission through one breach. Yet patients under surveillance have become substantially sicker, treatments more aggressive and hazardous, and diagnostic procedures more invasive. The fact that nosocomial

infection rates haven't doubled or tripled is absolutely astounding."

In CDC sentinel hospitals, infection rates rose 36% from 1975 to 1995, due in part to such aforementioned factors as an increase in intensive care patients and rapid discharge of less severely ill patients. **(See *Hospital Infection Control*, August 1998, pp. 121-122.)** While a 1985 CDC study on the efficacy of nosocomial infection control estimated that about one-third of nosocomial infections are preventable, Gaynes says it is getting more difficult to determine preventability.[2] "It's hard enough to determine if [patients] have an infection by reviewing a record, but it is almost impossible on an individual case-by-case basis to determine whether the infection was preventable," he says.

The CDC's most recent estimates project that 1.8 million infections occur annually, a rate of five per 100 hospital admissions, and the resulting infections contribute to 88,000 deaths annually. **(See *HIC*, May 1998, pp. 72-73.)** Comparing the CDC and the IOM estimates is difficult because the IOM cited several studies in assessing the toll of medical errors, but nosocomial infections are not clearly defined and included in all of them.[3-6]

Regardless, any such extrapolations should be viewed with caution because mortality due to nosocomial infection is often difficult to assess, adds veteran epidemiologist **William Scheckler**, MD, one of the original founders of the Society for Healthcare Epidemiology of America. "It's kind of hard to say sometimes what is the cause of death," says Scheckler, hospital epidemiologist at St. Marys Medical Center in Madison, WI. "If you have a patient with multiple-organ system failure who then gets septic, the best you may be able to say is that septicemia is a contributing factor. If you have someone with acute leukemia and they get blasted with chemotherapy, their white count is less than 500, and they get septic, is that an 'adverse event' from the medications they received? No, it is a side effect of the medications that they received, assuming they received the appropriate dosage."

In that regard, Scheckler reminds that the IOM's recommendations for a national center and state reporting of adverse events raise critical questions about patient risk adjustments and using common definitions for the events being reported. "Requiring everybody to report in the same way is a huge challenge," he says. "Just having the Congress pass a law to set up an agency won't do it."

Berwick concedes that "the definitional issues" are difficult, and the mortality projections used in the IOM report do not represent attributable mortality by epidemiological standards. "These numbers are estimates," he says. "I continue to feel if we are off by 50% and we are only killing 20,000 people, that is still pretty important. I think we have enough precision in these estimates to know that we have a problem here."

Still, Schaffner questioned whether the IOM report would ultimately only lead to another ineffectual bureaucracy unless funding to fulfill any recommendations includes bolstering nursing staff and upgrading health care worker training on safety and infection issues. "You can't empower something unless the Health Care Financing Administration, Medicare, and the third-party payers are willing to pay more for health care," he says. "How is it that we can add more personnel and train people better if we are losing money in health care? These are paradoxes that are not coherently addressed [in the IOM report]."

On the contrary, an investment in patient safety issues should reap benefits for hospitals, and resources should be forthcoming to support such programs, Berwick says. "Clearly, the public energy behind this issue has gone up, so I suspect that there will be some resources that will move to this," he says. "[But] if the position of a hospital leader is to say, 'OK, I will work on safety if you'll pay me to do it,' that is wrong. To increase patient safety is an obligation of leaders under current circumstances — including current financing."

(Editor's note: The IOM report is on the Internet at http://books.nap.edu/html/to_err_is_human/.)

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Vancomycin resistance emerging in *Staph aureus*

Fourth case in U.S. follows familiar pattern

The fourth case of vancomycin intermediate-resistant *Staphylococcus aureus* (VISA) has been confirmed in the United States, suggesting that cases may continue to appear in patients undergoing prolonged treatment with the last-line antibiotic for infections with methicillin-resistant *S. aureus* (MRSA). Infection control professionals should be particularly wary of vancomycin resistance appearing in dialysis patients under treatment for MRSA, as three of the four U.S. cases have been found in that group.

"We remain very concerned that populations of patients that are likely to carry methicillin-resistant *Staph aureus* and have vancomycin exposure would be the most likely group to present with one of these [VISA] organisms. Certainly dialysis fits that bill on both counts," says **Julie Gerberding**, MD, director of the hospital infections program at the Centers for Disease Control and Prevention.

Possibility of full resistance increases

With VISA cases now identified in Europe, Asia, and the United States, the possibility appears to be increasing that some staph strains will become fully resistant to vancomycin, often the drug of last resort for MRSA infections. "The concern is if staph has learned this trick, it wouldn't be unlikely that it would take it one step further," Gerberding tells *Hospital Infection Control*.

According to the CDC report of the case, in April 1999, a 63-year-old woman with MRSA bacteremia was transferred from a long-term-care facility to an Illinois hospital.[1] The patient had a history of frequent hospitalizations for complications of hemodialysis-dependent, end-stage renal disease. The patient also had two failed arteriovenous grafts, multiple central venous catheter-associated infections, and intermittent receipt of vancomycin therapy through June 1998.

Thirteen days after hospital admission and 25 days after initiating vancomycin therapy, a culture from the patient's blood raised clinical suspicions of a VISA infection. Confirmatory testing showed that the patient had a VISA strain with a minimum inhibitory concentration (MIC) of 8, the same level of intermediate resistance to vancomycin detected in the first documented case in Japan in 1996 and three subsequent U.S. cases in Michigan, New Jersey and New York.[2-4] **(See *HIC*, June 1998, pp. 80, 86-88; October 1997, pp. 145-152.)**

In the Illinois case, an echocardiogram demonstrated a mitral valve vegetation, but the patient declined surgical intervention, the CDC reported. Despite treatment with intravenous vancomycin, rifampin, and tobramycin, the patient died 10 days after the first VISA blood specimen was drawn. The cause of death was endocarditis. The VISA isolates in the Illinois case were resistant to penicillin, oxacillin, clindamycin, erythromycin, ciprofloxacin, and rifampin. They were susceptible to trimethoprim-sulfamethoxazole, tetracycline, and gentamicin, and had intermediate susceptibility to chloramphenicol. No VISA strains were recovered from other body sites.

None of the U.S. cases appear to be epidemiologically linked, as all involve distinct VISA strains that arose independently after exposure to vancomycin for treatment of MRSA. The mechanism of resistance has generally been described as an apparent thickening of the cellular material in VISA isolates. In reporting the case, the CDC reiterated that the recovery of *S. aureus* with reduced susceptibility to vancomycin (e.g., MIC greater than or equal to 4 µg/mL) should be reported promptly to the agency and to local and state health departments. CDC-recommended infection-control precautions for VISA should be implemented, and an epidemiologic investigation should be conducted.[5]

The pathogen also has been described as "GISA" (glycopeptide intermediate *S. aureus*), but the CDC is trying to end the confusion by reverting to the VISA acronym. GISA is a technically more accurate description because all isolates have shown intermediate-level MICs for the glycopeptide drugs vancomycin and teicoplanin, the CDC noted. However, concerned that clinicians may not recognize the term "glycopeptide," the CDC reported the latest case as a VISA infection.

An encouraging note is that no secondary VISA transmission has occurred in any of the U.S. cases. In the Illinois case, the CDC reported that the infection control department at the unidentified hospital correctly implemented VISA isolation precautions and prevented any secondary transmission. None of 10 family members or 171 health

care workers screened by nares culture was colonized with VISA. No other VISA isolates were identified in other hospitalized patients. "I think it is a reflection of the detection and response capabilities," Gerberding says. "Folks recognize that there is a risk here and implement the appropriate isolation precautions to prevent person-to-person spread, and also look aggressively to make sure that that hasn't already happened."

Prevention of the strains arising is problematic, however, as vancomycin is often a last-line drug for MRSA, which continues to plague hospitals and is arising in community strains. "The [Illinois] patient had MRSA, so it is not surprising that they would have reasonable indications for vancomycin," she says. "That is the problem. Once you get the MRSA, then there is good reason to use vancomycin."

On the other hand, susceptibility testing of isolates can be used to determine whether to discontinue empiric use of vancomycin if the staph strain is methicillin-susceptible, she emphasizes. "I think we need to be absolutely sure we know what we are treating when a problem like this arises," Gerberding says. "If we are using the drug empirically, it is important that we get the appropriate culture information and stop that therapy if we have evidence that we don't need it. Preventing MRSA infection is also a component of all of this, and that of course is a little harder to do."

In reporting the case, the CDC reminded that laboratorians may not be aware of proper methods for accurately identifying VISA. The hospital's laboratory in the Illinois case properly identified the VISA-infected patient by using confirmatory testing. The CDC protocol calls for targeting "candidate" strains (i.e., vancomycin MIC greater than or equal to 4 µg / mL) for confirmatory testing.

However, in a related report, the CDC also cited a 1998 survey that found that 16% of the labs could be missing VISA strains due to inappropriate testing.[6] "One could say, is the glass

CDC outlines staph testing options for labs

The Centers for Disease Control and Prevention's recent recommendations for testing for *Staphylococcus aureus* with reduced susceptibility to vancomycin include the following measures:[1]

Strategies for selection of isolates for additional testing:

Select isolates with vancomycin minimum inhibitory concentrations (MICs) of greater than or equal to 4 µg / mL. This is based on the apparent heterogeneity of strains because organisms with MICs of greater than or equal to 4 µg / mL have subpopulations with higher MICs. Clinical treatment failures have occurred with vancomycin in infections with these isolates.

Select isolates with vancomycin MICs of greater than or equal to 8 µg / mL (based on National Committee for Clinical Laboratory Standards [NCCLS] breakpoints. NCCLS MIC breakpoints for vancomycin are: susceptible, less than or equal to 4µg / mL; intermediate, 8-16 µg / mL; and resistant, greater than or equal to 32 µg / mL).

Select all methicillin-resistant *S. aureus* (MRSA). All identified isolates of *S. aureus* with reduced susceptibility to vancomycin have been MRSA.

Select all *S. aureus* isolates. Because little is known about the extent of this resistance, any *S. aureus* potentially could have reduced susceptibility to vancomycin.

Testing and confirmation:

Primary testing of *S. aureus* against vancomycin requires 24 hours of incubation time.

Disk diffusion is not an acceptable method for vancomycin susceptibility testing of *S. aureus.* None of the known strains of *S. aureus* with reduced susceptibility to vancomycin have been detected by this method.

An MIC susceptibility testing method should be used to confirm vancomycin test results.

[Editor's note: More information about testing for vancomycin intermediate-resistant S. aureus *and other resistant organisms is available on the CDC hospital infections Web site at www.cdc.gov/ncidod/hip.htm (click on "Laboratory").]*

Reference

1. Centers for Disease Control and Prevention. Laboratory capacity to detect antimicrobial resistance. *MMWR* 2000; 51:1,167-1,171. ■

half empty or half full?" Gerberding notes. "The fact that 84% were using the appropriate methods to detect it — and that survey was fairly early, when [VISA] was just beginning to emerge — suggests that we will have the laboratory capacity to diagnose this. There are a few places that need to gear up. I don't think there is a concern that we have missed a lot of cases at this point in time. But we need to make sure that everybody is geared up so nothing slips through the cracks."

The survey found that 278 (84%) of responding labs were using methods that allowed them to detect VISA isolates. However, 52 (16%) of responding labs — including labs in smaller hospitals and managed care-based labs — were using tests that would not identify the isolates, such as disk diffusion, with no additional method. Overall, approximately 40% of the laboratories were not performing confirmatory testing of *S. aureus* for reduced susceptibility to vancomycin. The testing of isolates of *S. aureus* for reduced susceptibility to vancomycin requires that laboratorians know the appropriate susceptibility testing methods and strategies for selecting candidate strains. **(See article, p. 23.)**

[Editor's note: CDC Information on VISA confirmatory testing, investigation therapy, and infection control guidelines can be obtained at www.cdc.gov/ncidod/hip/vanco/vanco.htm. The CDC is also seeking laboratory reports of confirmed cases of VISA infection for an ongoing nationwide epidemiologic study. Those wishing to report cases can contact CDC by phone at (404) 639-6413 or by e-mail at SEARCH@cdc.gov.]

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JOURNAL REVIEWS

MRSA screening proves cost-effective in ICU study

Infection rate reduced by 14%

Carine C, Durand-Zaleski I, Alberti C, et al**. Control of endemic methicillin-resistant *Staphylococcus aureus:* A cost benefit analysis in an intensive care unit.** *JAMA* 1999; 282:1,745-1,751.

To compare the costs and benefits of an MRSA control program in an endemic setting, the authors conducted a case-control study conducted at a medical ICU in a French university hospital.

The total costs of acquiring methicillin-resistant *Staphylococcus aureus* infection in an intensive care unit of the hospital was $9,275, making selective screening and isolation of carriers on ICU admission a cost-effective intervention, the authors noted.

Total costs of the control program ranged from $340 to $1,480 per patient, but a 14% reduction in MRSA infection rate resulted in the control program being cost-beneficial, they reported.

"Targeted screening for MRSA carriage at admission to high-risk areas helps identify a substantial proportion of colonized patients and contributes to early implementation of contact isolation to reduce the risk of cross-transmission," the authors concluded. "Compared with no screening, this strategy appears to effectively reduce MRSA rates."

The hospital had a 4% prevalence of MRSA carriage at ICU admission. Researchers randomly selected 27 patients who had nosocomial MRSA infection and matched them with 27 controls hospitalized during the same period without MRSA infection. The excess length of stay attributable to MRSA infection was four days overall. The authors reported a total excess cost of or $9,275 for nosocomial MRSA infection, with the mean excess cost running about $3,500.

"Our study suggest that identification of MRSA carriers via selective screening and subsequent isolation is a beneficial strategy when compared with no screening and standard precautions," they found. ▼

Surgical infections costly in lives, days, dollars

Briggs JP, Kirkland KB, Trivette SL, et al. **The impact of surgical-site infections in the 1990s: Attributable mortality, excess length of hospitalization, and extra costs**. *Infect Control and Hosp Epidemiol* 1999; 20:725-730.

Patients who develop surgical site infections (SSIs) are twice as likely to die, and those who survive will have longer and costlier hospitalizations than non-infected patients, the authors report. The total excess hospitalization and direct costs attributable to SSIs were 12 days and $5,038, respectively.

"If our estimates of the impact of SSI are applied to the entire United States, SSIs are responsible for approximately 20,000 in-hospital deaths and cost hospitals over $3 billion each year for inpatient care alone," the authors emphasized. "Infection control programs that include SSI surveillance coupled with feed-back to surgeons regarding their infection rates are effective in reducing the rate of SSI. Our study demonstrates both the enormity of the human and financial costs associated with SSI and the benefits to patients and the size of potential savings to hospitals if effective prevention programs are instituted and maintained."

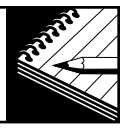
To determine mortality, morbidity, and costs attributable to SSIs in the 1990s, they matched a cohort of patients with SSIs one-to-one with patients without SSIs at a 415-bed community hospital. Overall, 225 pairs of patients with and without SSIs were matched on age, procedure, date of surgery, surgeon, risk index (from the Centers for Disease Control and Prevention National Nosocomial Infection Surveillance System), mortality, excess length of hospitalization, and extra direct costs attributable to SSIs. Of the 225 pairs, 20 infected patients (7.8%) and nine uninfected patients (3.5%) died during postoperative hospitalization. In addition, 74 infected patients (29%) and 46 uninfected patients (18%) required ICU admission.

The median length of hospitalization was 11 days for infected patients and six days for uninfected patients. The extra hospital stay attributable to SSI was 6.5 days. The median direct costs of hospitalization were $7,531 for infected patients and $3,844 for uninfected patients. The excess direct costs attributable to SSI were $3,089. Among the 229 pairs who survived the initial hospitalization, 94 infected patients (41%) and 17 uninfected patients (7%) required readmission to the hospital within 30 days of discharge. When the second hospitalization was included, the total excess hospitalization and direct costs attributable to SSI were 12 days and $5,038, respectively.

"As more patients undergo outpatient and short-stay surgical procedures, fewer SSIs are detected prior to discharge," the authors noted. "This trend may in turn lead to underestimates of the rate of SSI and of the human and economic costs of such infections. Our study demonstrates the enormous negative impact that SSIs continue to have and the importance of looking beyond the initial postoperative hospitalization to determine the total costs of these infections." Indeed, SSIs at the hospital accounted for five deaths, a total of 107 days in the ICU, 920 days of hospitalization, and $473,997 in direct costs annually. SSI patients are more than five times more likely to be readmitted to the hospital, with many ending up in intensive care units, they noted.

"[Infection control] programs that reduce the incidence of SSI can substantially decrease morbidity and mortality and reduce the economic burden for patients and hospitals," the authors concluded. ■

GUEST COLUMN



Weighing worker, employer issues for HCV testing

By **Patrick Joseph**, MD
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Hepatitis C virus (HCV) disease remains epidemic in the United States, and health care workers are clearly at risk for occupationally acquired HCV infection. As a result, many infection control professionals have designed protocols that include postexposure serologic hepatitis C testing to diagnose infection and, perhaps, allow the institution of early therapy.

Subsequently, there have been informal discussions about the possibility of routinely screening health care workers at the time of initial employment to identify unrecognized HCV infection. ("Routine" in this setting means testing for HCV antibody without suspected or known exposure.)

Furthermore, some have advocated repeat testing at periodic intervals. Because there are medical, social, and financial implications of any testing policy, it is reasonable to consider the potential roles and limitations of routine testing for HCV in health care workers. Reasons to obtain routine HCV testing include the following:

1. Benefit to the health care worker (to identify the person who unknowingly is infected and provide valuable personal information to this individual), thus providing an altruistic service in this era of a silent epidemic.

2. To identify those who may pose a risk to patients for employee-patient transmission of HCV. At least at present, with very few documented cases of caregiver-to-patient transmission, this seems to be of questionable significance.

3. Risk management for the employer: To identify the health care worker who was infected prior to employment, thereby reducing the risk of workers' compensation liability for the employer in the event that the health care worker subsequently is found to be HCV-positive.

Cost issues are among the reasons not to do routine HCV testing of health care workers. Also, work restrictions for HCV-positive health care workers presently are not indicated. Not surprisingly, the financial determinant seems to be the driving force, since there are valid medical reasons to do HCV testing. If HCV testing were free or as simple as a urine dipstick, I suspect many, if not most, employers would offer or require routine testing for all health care workers — at least at the time of employment and perhaps, as an employee benefit, at periodic intervals. But that's not the case. Hepatitis C testing is not free. Applied nationally, the cost would be staggering. Therefore, any policy for routine (non-postexposure) HCV testing of health care workers should be based on a clear reason for identifying those who are seropositive.

Financial issue a driving force

It would be wonderfully altruistic if employers would offer HCV testing purely as a benefit for employees, to identify those who may benefit from therapy. However, considering the financial pressures on health care providers, this approach is unlikely to be widely accepted. In fact, if we could allocate funds to disease screening for our employees, we might provide a better service and a better use of funds by testing for other "silent diseases," the early treatment of which is more likely to provide benefit to the health care worker (e.g. hypertension, hyperlipidemia, hyperglycemia, hepatitis B, or even coronary artery disease). At the present time, a policy of widespread screening to identify HCV-positive employees to reduce the risk of transmission to patients is unsubstantiated by scientific data. So the most likely reason for approving the development of a routine screening policy for hepatitis C would seem to be to benefit the employer.

This is not to imply that any particular policy is unethical or inappropriate, but rather that before design, the goal of the policy should be clearly understood by all persons involved. If this latter goal is adopted, subsequent validation of the expense should be sought. Specifically, is it known that employers have borne the expense of workers' compensation hepatitis C claims when it is likely that the employee did not acquire the infection at work? If this suspicion is probable or proven, the costs for pre-employment screening of hepatitis C in new employees should be explored.

In reality, the cost / benefit ratio for routine hepatitis C screening of health care workers remains undefined. To reach a specific definition, one must identify all components of the costs (testing,

reporting, recording, record keeping, and time for explaining positive and negative results) and the benefit to the bearer of the cost.

An example of pre-employment screening might be tabulated as follows: test cost ($15 each); laboratory handling cost ($5 per person); employee health counseling and record keeping (about 15 minutes, $10). Thus, an estimated $30 would be required for each test. If 300 new employees per year were hired by this facility, the cost would be approximately $9,000 per year, or $90,000 over the next 10 years.

One must weigh these costs against the expense of workers' compensation coverage and the likelihood that an employee would be *incorrectly* considered to have acquired hepatitis C on the job if no baseline data were available. Thus far, it appears that this issue is similar to most in which the driving force is allocation of limited health care resources. The answers will likely vary and will be specific to the preferences of decision makers at each institution.

Clearly, we need more data about the incidence and risk of hepatitis C in health care workers and the financial consequences to employers of unscreened workers who are found to be positive after employment. Until these data are available, I am reluctant to recommend widespread pre-employment HCV testing for all hospitals, clinics, doctors offices, labs, blood banks, and every other place in which a needlestick might occur. My hunch is that our limited funds would be more wisely applied elsewhere.

(Editor's note: Patrick Joseph, MD, is the consulting editor of Hospital Infection Control.*)* ■

Clinton proposes national infection surveillance plan

Funds earmarked for emergency room tracking

In a critical step for the Centers for Disease Control and Prevention's emerging infections plan, the Clinton administration has proposed a $20 million allocation to develop a national disease surveillance system. If approved by Congress, the increased funding would be included in the fiscal year 2001 budget.

The increased funding, which supplements the CDC's current budget of $44.3 million, is intended to speed the development of a national electronic disease surveillance network linking all 50 states. The CDC's 1998 emerging infection plan underscored the importance of upgrading and integrating infectious disease surveillance to rapidly detect new syndromes and outbreaks.[1]

The CDC currently is integrating data from several systems, including the epidemiology and laboratory program, the emerging infections program, and provider-based sentinel networks.

"Our surveillance systems, to some degree, have grown up over time almost independent from each other," says **Stephen Ostroff**, MD, associate director of the CDC National Center for Infectious Diseases. "That makes it very difficult not only within CDC to exchange information across these systems, but also makes it very difficult for [clinicians and public health officials] out

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there. So one of the components of overhauling our system is to fix that particular problem."

Through state and local health departments, the CDC hopes to be able to use computers to access reports from clinical laboratories and emergency departments, he tells *Hospital Infection Control*. CDC would not actually gather patient identification data, but would get a much clearer picture of trends in populations and regions, he notes. "The local health departments would get the information sooner so that they can investigate the circumstances," Ostroff says. "In addition, as [reports] work their way up through the system, we might potentially recognize patterns of additional cases. That would warn us quite quickly — much earlier than currently — that there is a new outbreak occurring somewhere."

Global travel, population growth, increased use of antibiotics, and increased human contact with animal wilderness habitats have all been cited for the increase in new infectious agents or the resurgence of old ones over the last 25 years.

Plans call for information collected through the surveillance activities to be compiled and sent to physicians electronically, enabling providers to hone treatment strategies. For example, physicians may find out which types of bacteria are resistant to antibiotics or which strain of influenza is circulating among their patients.

The new funds also will be invested in developing public-private partnerships to ensure that commercial labs implement an electronic reporting system compatible with the one currently being developed for state and local public health departments. Under this system, private commercial labs, with appropriate privacy protections, will automatically send information on the incidence of infectious diseases to public health departments for analysis and integration into larger surveillance efforts. Pilot projects implementing this type of system in seven states have indicated significant increases in reporting of infectious disease. The increase in reported data provides a more complete picture of disease incidence to public health officials, allowing them to move quicker to address potential public health threats.

Reference

1. Centers for Disease Control and Prevention. *Preventing Emerging Infectious Diseases: A Strategy for the 21st Century*. Atlanta, 1998. ■

CE objectives

After reading each issue of *Hospital Infection Control*, the infection control professional will be able to do the following:

- identify the particular clinical, legal, or educational issue related to epidemiology;
- describe how the issue affects nurses, hospitals, or the health care industry in general;
- cite solutions to the problems associated with those issues, based on guidelines from the federal Centers for Disease Control and Prevention or other authorities, and / or based on independent recommendations from clinicians at individual institutions. ■

Healthcare Infection PREVENTION™

A Bimonthly Supplement on Infection Control Issues Across the Continuum of Care

Landmark guidelines issued for IC beyond the hospital

Consensus panel emphasizes ICP expertise

In what may signal a landmark expansion of infection control beyond the hospital, a consensus panel has issued a report on the essential infection control requirements for out-of-hospital settings. With representation from infection control professionals, epidemiologists, public health officials, and quality accreditation, the panel has established the first consensus program standards in a rapidly expanding area of health care. The report places a premium on the expertise of infection control professionals, calling for non-hospital settings to seek the oversight of hospital-based ICPs or infection control consultants in implementing the recommendations. **(See recommendations, pp. 3-4.)**

The panel concedes that some organizations will not be of the size or complexity to justify the resource commitment of a full-time, on-site ICP. However, the report emphasizes that an ICP should be consulted for oversight if the person charged with the responsibility for infection control in the health care organization is not specially trained or experienced in epidemiology. "There may be a person designated, but the organization should still seek the wisdom and knowledge and experience of someone who is really trained in infection control and hospital epidemiology," says panel member **Candace Friedman**, MT (ASCP), MPH, CIC, manager of infection control and epidemiology at the University of Michigan Hospitals and Health Centers in Ann Arbor.

Moreover, given the increasing emphasis on cost containment and the need to justify expenditures, a trained and experienced ICP can be especially helpful in evaluating the cost of the non-hospital program and balancing these expenses against the benefits and requirements of the infection control program as outlined in the recommendations, the panel noted. The panel was formed by the Association for Professionals in Infection Control and Epidemiology and the Society for Healthcare Epidemiology of America. It also included representation from the Centers for Disease Control and Prevention and the Joint Commission for Accreditation of Healthcare Organizations.

"It is the duty and responsibility of health care organizations to implement these recommendations," emphasizes **William Scheckler**, MD, hospital epidemiologist at St. Marys Medical Center in Madison, WI, in a written introduction to the report.[1] A key panel member in a similar consensus effort for acute care hospitals, Scheckler says the time has come to underscore the importance of infection control across the continuum.[2]

"Health care is no longer limited to the acute care hospital. It is a continuum from the home to the outpatient clinic, to the hospital, to nursing homes, to rehab facilities and [other] freestanding facilities," he tells *Healthcare Infection Prevention*. "For example, at least 50% of surgical procedures that used to be done in the hospital operating suite are now being done in day-care surgical centers and surgeon's offices. We felt it was important to examine what modest amount of literature was available for these sites and extend the good principles and practices for both epidemiology and infection control to these sites."

Indeed, the report notes that the last decade has seen much nationwide growth in managed care organizations, which have changed provider reimbursements and restructured the entire health care system. As a result, diversification

and integration strategies have blurred historical separations between hospitals, nursing homes, ambulatory care, physicians, and other providers. Accordingly, the degree and complexity of care provided in out-of-hospital settings has increased markedly in recent years.

"Infection prevention and control issues are important throughout this continuum of care," the consensus panel concluded. "Infections in patients may lead to serious morbidity and mortality, readmission or admission to a hospital, increased use of antibiotics, and increased costs of care. Performing surgical procedures, invasive device insertions and managing and providing care for patients who are increasingly immunocompromised in these settings presents new infection control challenges. Therefore, infection control practices must now encompass infections that patients may acquire as a result of their care or treatment outside the acute care hospital as well as protect health care providers and caregivers in these settings."

Will funding be forthcoming?

But the question inevitability arises about funding the recommendations, which call for surveillance, reporting, and interventions to prevent infectious complications in non-hospital settings. The consensus panel emphasized that health care organizations should provide the necessary resources and personnel to enact the recommendations. "I think the resources will be there because the accreditation bodies are already looking at outpatient and other kinds of facilities, both at the state level, the Joint Commission level, and even the National Commission on Quality Assurance," Scheckler says. "All of these [groups] will recognize soon, if they haven't already, that prevention of infections — protection of the patient and the health care worker — is in everyone's best interest. So the resources will be there."

Panel discussions in forming the guidelines acknowledged that the level of response to the recommendations may vary considerably in different non-hospital settings, adds Friedman. "But part of what the document hopes to achieve is to help convince an organization that it really should support this kind of a program," she says. "I don't see it as a wish list."

In implementing the recommendations, non-hospital settings should focus on their best assessment of their high-risk areas, she says. "Those are the areas that should be followed in some manner," she says. "I don't think anyone on the consensus panel thought that surveillance in a home care setting would be identical to the type of surveillance in an acute care setting. It's not that they need to do the same kinds of things. It's that they need to evaluate what are their issues and then figure out the best way to [address them.]"

Regardless of setting, ongoing communication across the continuum is one of the key recommendations to prevent infections as patients move to various points in the delivery system. "If you're in an extended care facility, for example, and you identify something that you consider to be an infection, that may have related to a patient's acute care stay," she says. "Communicating that information [is important]. And vice versa, [hospital ICPs] need to inform the extended care facilities."

References

1. Friedman C, Barnett M, Buck AS, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in out-of-hospital settings: A consensus panel report. *Infect Control Hosp Epidemiol* 1999; 20:695-705.
2. Scheckler WE, Brimhall D, Buck AS, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in hospitals: A consensus panel report. *Infect Control Hosp Epidemiol* 1999; 19:114-126. ■

A consensus panel recently issued 23 recommendations for infection control programs in non-hospital settings.[1] The ranking categories for the recommendations are summarized as follows:

Rankings:

I. Strongly recommended for implementation based on: Evidence from at least one properly randomized, controlled trial, or evidence from at least one well-designed clinical trial without randomization, or evidence from cohort or case-control analytical studies (preferably from more than one center), or evidence from multiple time-series studies.

II. Recommended for implementation based on: Published clinical experience or descriptive studies, or reports of expert committees, or opinions of respected authorities.

III. Recommended when required by governmental rules or regulations

Reference

1. Friedman C, Barnett M, Buck AS, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in out-of-hospital settings: A consensus panel report. *Infect Control Hosp Epidemiol* 1999; 20:695-705. ■

Requirements for Infrastructure and Essential Activities of Infection Control and Epidemiology in Out-of-Hospital Settings[1]

Managing Critical Data and Information, Including Surveillance for Infections

Recommendation 1: Infection control personnel should develop policies and procedures for ongoing communication with other health care organizations (HCOs) to identify, prevent, manage, and control infections as patients move between HCOs throughout the continuum of care. *Category II*

• Report infectious complications and adverse events associated with medical and surgical procedures (i.e., surgical site infections) to the HCO in which the procedure was performed or from which the patient was discharged.

• Report epidemiologically important infections to the HCO to which the patient will be transferred.

Recommendation 2: Surveillance of health care associated infections must be performed. *Category I*

Incorporate the following elements in the surveillance process:

• Identification and description of the problem or event to be studied;

• Standard case definitions appropriate for the setting;

• Definition of the population at risk;

• Selection of the appropriate methods of measurement, including statistical tools and risk stratification;

• Identification and description of data sources and data collection;

• Definition of numerators and denominators;

• Preparation and distribution of reports to appropriate groups.

Recommendation 3: Surveillance data must be appropriately analyzed and used to monitor and improve infection control and health care outcomes. *Category I*

Recommendation 4: Clinical performance and assessment indicators used to support external comparative measurements should meet the criteria previously delineated by APIC and SHEA for hospitalized patients. *Category II*

Specifically, these indicators and their analyses must address:

• How process is related to outcomes;

• How to measure variation and quality;

• That the numerators and denominators are defined;

• That data collection is feasible, and the collected data are collected completely and reliably;

• That the data are appropriately risk-adjusted when analyzed;

• That data be adjusted for the populations' severity of illness and case-mix differences when analyzed before external comparison;

• That personnel be trained regarding proper study and use of indicators;

• That benchmarks be developed and used to compare the indicators' performance.

Developing and Recommending Policies and Procedures

Recommendation 5: Written infection prevention and control policies and procedures must be established, implemented, maintained, and updated periodically. *Both Categories II and III*

• The policies and procedures should be scientifically sound.

• The policies and procedures should lead to improved prevention of infections and other adverse events or improved patient and employee outcomes.

• The policies and procedures should be reviewed regularly to assess their practicality and cost-effectiveness.

• The policies and procedures should incorporate compliance with regulatory issues.

Recommendation 6: Policies and procedures should be monitored periodically for effectiveness, both to ensure that staff are able to comply fully with and fulfill organizational requirements and to ensure that the policies are having the desired result in preventing and controlling infections. *Both Categories II and III*

Compliance With Regulations, Guidelines, and Accreditation Requirements

Recommendation 7: HCOs should engage infection control personnel in maintaining compliance with relevant regulatory and accreditation requirements. *Both Categories II and III*

Recommendation 8: Infection control personnel should have appropriate access to medical or other relevant records, information in regard to the HCO's compliance with regulations, standards, etc., and to staff members who can provide information on the adequacy of the HCO's compliance with regard to regulations, standards, and guidelines. *Both Categories II and III*

Recommendation 9: The infection control program should collaborate with, and provide liaison to, appropriate local and state health departments for reporting of communicable diseases and related conditions and to assist with control of infectious diseases in the community. *Both Categories II and III*

Employee Health

Recommendation 10: The infection control program personnel should work collaboratively with the HCO's employee health program personnel. *Category II*

• The HCO should have access to consultation and direction from a physician (or designee) with expertise in infectious disease and health care epidemiology.

• Infection control personnel should review and approve all employee health policies and procedures that relate to the transmission of communicable diseases in the HCO.

Recommendation 11: At the time of employment, all HCO personnel should be evaluated for conditions relating to communicable diseases. *Both Categories II and III*

The employment record should include the following:

• Medical history, including immunization status and assessment for conditions that may predispose personnel to acquiring or transmitting communicable diseases;

• Tuberculosis screening;

• Serologic screening for vaccine-preventable diseases, as deemed appropriate;

• Such medical examinations as are indicated by the above.

Recommendation 12: The HCO evaluates employees and other health care workers (e.g., students, volunteers) for conditions related to infectious diseases that may have an impact on patient care, the employee, or other health care workers periodically. This evaluation should include a review of required immunizations and status of tuberculosis screening. *Both Categories II and III*

• Medical records of all health care workers must be kept confidential.

• The HCO should track employee immunization and tuberculosis screening status.

Recommendation 13: Employees must be offered immunizations based on regulatory requirements. HICPAC Personnel Guidelines and recommendations of the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices for health care workers should also be followed. *Both Categories I and III*

Recommendation 14: The HCO's employee health program should institute policies and procedures for the evaluation of exposed or infected health care workers. *Category I*

• Exposed health care workers should be evaluated for circumstances surrounding the exposure, evaluation of symptoms, need for postexposure prophylaxis, need for treatment, and work restrictions.

• Infected symptomatic and asymptomatic health care workers should be assessed for disease communicability, work restrictions, and treatment, as appropriate.

Intervening Directly to Prevent Infections

Recommendation 15: Infection control personnel in HCOs must have the capacity to identify and implement measures to control endemic and epidemic infections and adverse events. *Category I*

• HCOs must have an ongoing system to obtain pertinent microbiologic data.

• Ongoing communication and consultation with clinical staff throughout the organization must be maintained to identify infectious and adverse events, to assist in maintenance and monitoring of infection control procedures, and to provide consultation.

• When an outbreak occurs, infection control personnel must have adequate resources and authority to ensure a comprehensive and timely investigation and the implementation of appropriate control measures.

• Institutional policies and procedures should be developed so that roles and responsibilities are outlined clearly.

Educating and Training Health Care Workers, Patients, and Nonmedical Caregivers

Recommendation 16: HCOs must provide ongoing educational programs in infection prevention and control to health care workers. *Both Categories I and III*

• Infection control personnel knowledgeable regarding epidemiology and infectious diseases should be active participants in the planning and implementation of the educational programs.

Recommendation 17: Educational programs should be evaluated periodically for effectiveness. *Both Categories II and III*

• Educational programs should meet the needs of the group or department for which they are given and must provide learning experiences for persons with a wide range of educational backgrounds and work responsibilities.

• Participation of health care workers at educational programs should be documented.

Recommendation 18: The health care organization must have a mechanism to ensure that patients and caregivers receive appropriate information regarding infection prevention and control. *Category II*

Resources-Personnel

Recommendation 19: The HCO must assure adequate personnel and supporting resources to fulfill the functions of the infection control program. *Category II*

Recommendation 20: All HCOs should have access to the ongoing services of a person who is trained in infection prevention and control (i.e., an infection control professional [ICP], who provides oversight for the infection control program). *Category II*

Recommendation 21: All HCOs should have access to continuing services of a physician trained in health care epidemiology. *Category II*

Recommendation 22: ICPs should be encouraged to obtain Certification in Infection Control. *Category II*

Other Resources

Recommendation 23: Resources should be provided for continuing professional education of employees and infection control personnel who work directly for the organization. *Category II*

Reference

1. Friedman C, Barnett M, Buck AS, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in out-of-hospital settings: A consensus panel report. *Infect Control Hosp Epidemiol* 1999; 20:695-705. ■