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Special Coverage: **The 1999 APIC Conference**

No longer business as usual: ICPs must prove cost-effective to survive

Ask yourself: 'Does the institution value the ICP role or merely tolerate it?'

Wresting order out of chaos, infection control professionals must create cost-effective prevention programs across the continuum if they are to remain key players in the market-driven health care delivery system of the 21st century, keynote speaker **Julie Gerberding**, MD, MPH, told some 3,000 ICPs in Baltimore recently at the annual conference of the Association for Professionals in Infection Control and Epidemiology.

"We are really operating in the era of market power, where our entire health care delivery system is being driven and framed by the economic forces that face business communities in the rest of corporate America," said Gerberding, director of the hospital infections program at the Centers for Disease Control and Prevention. ". . . It is no longer sufficient to do what we do because we know it's the right thing. We must do what we do because it is cost-effective. The bottom line is what is driving decisions."

ICPs may find their current programs undermined by conflicting business and medical imperatives that result in a dizzying rate of change that

APIC makes last-ditch effort to block TB rule

In an 11th-hour gambit aimed at blocking finalization of controversial federal tuberculosis regulations, the Association for Professionals in Infection Control and Epidemiology in Washington, DC, is calling on Congress to order a scientific review of the need for the standard. If successful, the move could indefinitely delay finalization of the 1997 proposed TB standard by the Occupational Safety and Health Administration, meaning infection control professionals would

*(See **Last-ditch effort** on page 100)*

closely resembles chaos — "a dynamic state on the boundary between anarchy and order," Gerberding noted. The converging trends include health care systems merging and consolidating, personnel shifts and cutbacks, declining hospital stays, infection control resources stretched thinner across an expanding continuum, and patients with rising acuity exposed to pathogens increasingly resistant to antibiotics, she noted.

"Our highly competitive, market-driven system really is plagued with a diminishing infection control prevention capacity," Gerberding said. "We are not seeing an expansion of the number of infection control professionals in the delivery system; we are seeing a redistribution of those professionals. More people are being asked to do more with less resources across a larger number of venues. We are being dispersed and our resources are being spread thinner and thinner. At the same time that our staffs are being dispersed, our sick patients are being dispersed so that the acuity of individuals with health problems is being distributed over a much wider variety of health care settings. . . . In other words, the entire health care delivery system in which we operate is a system of chaos."

Gerberding accented themes of change and challenge that were echoed by other APIC speakers throughout the conference, as the future role of ICPs in a rapidly changing health care system was subjected to a series of frank but cautiously optimistic assessments. For example, chaos theory ascribes a kind of underlying order and even a certain beauty to states of flux, Gerberding reminded APIC attendees. She also noted that despite the swirl of change, ICPs' jobs distill down to a few constants.

"Our first priority is really to enhance our capacity to prevent infections among patients and health care workers across the entire spectrum of the health care delivery system," she said. "When we're talking about infection prevention in health care settings, when you get right down to it, there really are only four things that we can do. We can try to prevent the primary infection in the first place. We can try to treat infections when they do occur and eradicate the pathogen as quickly as possible. We can do everything possible to minimize antimicrobial selection pressure so that the pathogens that we do encounter will at least be susceptible to the drugs that we are using. And, last but not least, we must prevent cross-transmission from person to person once an infection has occurred."

All the while, these goals must now be accomplished in a cost-effective manner that can be described to health care business leaders in their own language, she noted. In that regard, the CDC hospital infections program is undertaking a research initiative on the cost-effectiveness of infection control and prevention that may include contracts and grants to stimulate investigations.

"We need your help," Gerberding appealed to APIC attendees. "We need your ideas and experience in doing cost-effective analysis so that we can pull this together into a package and say, 'Look, here it is: Infection control is cost-effective.'"

Some job justification successes

Indeed, many ICPs are already emphasizing cost-effectiveness, as several APIC studies and presentations underscored the importance of compiling and reporting financial data to bolster program profiles and enhance job security. **(See related story, p. 102.)** **Denise Murphy**, RN, MPH, CIC, director of infection control at BJC Health System in St. Louis, described a program particularly in tune with many of the themes raised by Gerberding. BJC is a system of 13 acute care and six long-term care facilities in Missouri and Illinois. As BJC merged at the corporate level during the last few years, Murphy and the ICPs at the other BJC facilities formed an infection control consortium to emphasize cost savings in infection prevention.

"I don't mean to belittle the impact that it has on our patients physically and psychologically when they develop nosocomial infections, but unfortunately, for our programs to survive, we really need to know what the bottom line is and be able to express that to our health care administrators," Murphy told APIC attendees. "If your hospital is in bad financial shape, one way that infection control can survive is to point out many of the cost-saving projects that you are involved in. If you are not involved in any of them, it might be important to get involved in some of them."

As the ICPs at BJC began sharing data and working together, it became clear that they could collectively underscore the economic importance of infection control and prevention across their

health care system. "We sat down with each hospital president and talked about what infections were costing across the system," she said, noting that for 1997, some $4.6 million in excess costs were caused by infections that included bloodstream infections, surgical site infections related to coronary artery bypass grafts, and surgical site infections following knee and hip replacements.

"They were very interested in that figure, and I really do believe that providing them with financial impact data — especially when the infection control programs cost so little — was very important," Murphy said.

The consortium has since developed sharply focused surveillance and cost-saving interventions that have resulted in more than $1 million saved and a considerable increase in infection control staff and resources at the participating facilities, she said.

Such cost-saving efforts do not necessarily require state-of-the-art computer support, she emphasized. "Whether it is drawing an epicurve for an outbreak investigation, plotting your improvement in vaccination rates, or improvements in bloodstream infection rates, you can do this with a piece of graph paper and a pencil," she said. "What is important is that you are doing it and getting that information out to the right people. [Use] your data to impact change."

ICPs in hospitals that are part of mergers should consider such consortium efforts, but even independent practitioners can band together as part of their local APIC chapters, she added. "This is just about team-building and teamwork," Murphy said. "I can't stress enough the importance of expanding your infection control team to include other members of the health care team — like people from surgery, ICU, pharmacy and the lab — that are really experts in their area."

Indeed, ICPs have traditionally operated with a sense of autonomy that needs to be cast aside to some degree to get "out of the box" and find new opportunities in a changing system, added another APIC speaker, **Marguerite Jackson**, RN, PhD, CIC, FAAN, administrative director of the clinical epidemiology unit at the University of California in San Diego.

"Staying in the box permitted us to be experts in a narrow area, and it was comfortable," she told APIC attendees. "[Today] there is much more scrutiny, much more accountability, because the circumstances have changed so dramatically that there is very little extra time to do things that are not directly related to the mission, the vision, and the bottom line."

Noting that the only constant appears to be change, Jackson emphasized that ICPs must assess their own role and management perceptions within their facility. "Does the organization value the ICP role or merely tolerate it? Ask yourself that question," she said. "Is the ICP's expert knowledge used widely, or held tightly and let out of the box only when a question is asked? When the money gets tight, who gets laid off?"

Make yourself indispensable

ICPs who make themselves indispensable to the facility's mission will survive, while those who pursue personal autonomy at the expense of institutional goals may not enjoy "long-term survival," Jackson noted. And ICPs need not think merely in terms of survival, as their diverse epidemiologic backgrounds also lend them to leadership and executive roles, added **Trisha Barrett**, BSN, CIC, MBA, director of infection control and sterile processing at Alta Bates Medical Center in Berkeley.

Having received her master's degree in business administration in 1998, Barrett offered some recent insights from the business world. ICPs today are in a good position to have a valuable operational overview of their work sites, she noted. The very nature of the profession demands observational, analytical, and communication skills. Those factors, combined with oversight and responsibility for regulatory issues, give ICPs a strong background for health care leadership, she noted. In that regard, ICPs should look for opportunities to expand their authority, capitalizing on management needs in related areas like central supply and sterilization, intravenous services, and inpatient testing. Concerning the current turmoil in health care, Barrett reminded that ICPs typically have always had a high "tolerance for ambiguity" in order to work in a field seemingly beset by change since its inception.

"I don't think there is anything new about the change issues, and those of us who like this job and succeed in the job are good at managing change," Barrett says. "That is a good springboard skill." ■

APIC makes last-ditch effort

(Continued from front page)

not have to bring their programs into compliance with the full range of TB skin testing, respiratory protection, and other provisions detailed in the proposed rule.[1]

In developments outlined recently in Baltimore at the annual APIC conference, the association reports it has gained the sympathetic ear of U.S. Rep. Roger Wicker (R-MI), a member of the House Appropriations Subcommittee for Labor, Health and Human Services. According to a deal brokered by APIC governmental affairs representatives, Wicker is poised to introduce a "rider" to appropriations legislation that will essentially withhold funding unless OSHA submits the TB rule to a scientific review by the Institute of Medicine (IOM) in Washington, DC. Calls to Wicker's office were not returned as this issue of *Hospital Infection Control* went to press. However, one of the APIC principals involved says all signs appear favorable for the legislation to be introduced, at which time APIC members will be asked to call the other members of the committee and lobby for passage.

"What we hope to accomplish is that the IOM study will put a halt to the promulgation of the proposal as it is currently," says **Julie Sellers**, RN, CIC, one of APIC's leaders in the TB fight and immediate past chairperson of the governmental affairs committee. "Then through the information culled from the IOM study, identify what is really necessary, if anything is, beyond the CDC guidelines and adopt something that is finally science-based and is appropriate for the epidemiology and the rate of TB today."

Reaction was swift and critical from APIC's principal opponent in the TB debate, the Service Employees International Union in Washington, DC. The SEIU, which represents some 650,000 health care workers, will adamantly oppose the rider if it is introduced, says **Bill Borwegen**, health and safety director at the SEIU.

"It just borders on outrageous," he says. "It is inconceivable that this could be delayed any longer. This was a rule that was going to be fast-tracked and it has been six years [in development]. This is an important standard that is going to save workers' lives."

OSHA proposed the TB rule — and ignited one of the more controversial debates in recent infection control history — to protect health care workers from occupational TB after the disease dramatically resurged from 1986 to 1992. With TB incidence among U.S.-born residents in its sixth consecutive year of decline, APIC has continued to oppose the need for any regulation beyond the 1994 TB guidelines by the Centers for Disease Control and Prevention.[2]

APIC cites TB declines in HCWs

Further bolstering its argument that the standard is no longer needed, another APIC speaker said the association is aware of unpublished data from the CDC showing that rates of TB in health care workers are in decline and the recommended frequency of skin tests in some settings may be increased to every two years rather than annually. Independent confirmation of that development could not be obtained from the CDC's division of TB elimination, where a spokeswoman says the agency would not comment on unpublished data. The matter was reported at APIC by **Eddie Hedrick**, MT(ASCP), CIC, chairman of the APIC TB task force.

"APIC was also provided with an analysis of the most current TB data from CDC demonstrating that the risk is actually higher in the general population than it is now in health care workers," Hedrick, infection control manager at the University of Missouri Hospital and Clinics in Columbia, told APIC attendees. "This has been substantiated in a phone call conversation with CDC personnel this past week. Recent unpublished CDC studies are finding very low [TB skin test] conversion rates in health care workers in different parts of the country, which is now stimulating them to reconsider the frequency of skin-testing requirements for health care workers in different geographic locations."

The development is another example of why flexible CDC guidelines are preferable to OSHA standards, allowing periodic revisions without having to amend a codified standard, Hedrick added.

"You try that with OSHA after it is carved in concrete; it ain't going to happen for a long time," Hedrick tells *HIC*. "All we are looking for is a science-based document that is practical and effective in our facilities that we can work with. We're really not adversaries. They seem to think that, but who else is responsible for protecting

health care workers and patients? The idea is, how do we get there in a cost-effective [way]? We don't have the money to throw out there for stuff that is unnecessary."

With OSHA expected to finalize the standard by year's end or in 2000, the congressional maneuver appears to be APIC's last realistic chance of blocking the regulation.

"A Republican-controlled House is good for us because they are pro-business rather than pro-OSHA, which tends to have Democratic supporters," Sellers adds. "So anything that is going to save money and avoid constraints on business is seen as a good thing in this Congress. Usually, the way the bargaining goes, each one of the appropriations [committee] members has one or two favors that they put on the table and they get if everybody else gets theirs on the committee. This is Wicker's big one. This is what he wants, so we feel like we can get it through."

The rider scientific-review strategy is similar to the approach that has been used to long delay a federal ergonomics standard to protect workers from repetitive motion injuries, Borwegen says. Though conceding that the strategy can be effective in a Republican-controlled Congress, he also noted that riders may red-flag legislation for presidential veto.

Still, with the threat of multidrug-resistant strains of TB and continued increases in the disease among the foreign-born, APIC is wrong to oppose a standard that could, ironically, provide its members more job security as their facilities' primary compliance officers, Borwegen says. "Why do they want to keep carrying the baggage for the corporate health care industry, which will only result in them getting downsized and unemployed?" Borwegen asks. "Why don't they fight for the type of regulatory mandates that provide them with the resources to protect people?"

But Hedrick argues that APIC has consistently pursued a scientific approach to TB, and is not opposed to OSHA taking action against facilities that refuse to protect workers by following the CDC guidelines. "The voluntary approach to this on the part of most institutions in the United States has lowered the risk of TB to health care workers," he says. "For those facilities or people who are not complying with the CDC guidelines, OSHA needs to find a way to deal with it. I think they can use their general duty clause. At the [TB] hearings, we gave them a brief checklist of basic questions they could ask that will tell them whether somebody is in compliance. It isn't rocket science." **(See *HIC*, August 1998, p. 115.)**

OSHA had not returned a call requesting comment on the matter as this issue went to press. Borwegen says OSHA cannot effectively enforce measures under its general duty clause because the citations are more easily challenged and delayed. "It's not a solution, because when employers contest items under the general duty clause, we don't really have a process in place to adjudicate those," he says.

What about undiagnosed cases?

In his APIC presentation, Hedrick reiterated that the association has fought the standard in part because so many of the requirements do not address transmission from the undiagnosed case. "Greater than 73% of occupational-acquired TB reported in the literature and experienced by most of us in this room is the result of an exposure to an undiagnosed or unsuspected infection," he said. "The additional [OSHA] control measures that go beyond the CDC guidelines address only the known case. So it misses a large percentage of what we are dealing with."

Some eight nosocomial TB outbreaks that occurred during 1990 to 1992 greatly concerned ICPs, but it is important to remember how the situation ended, he added. "All these outbreaks were brought under control using common-sense infection control programs which emphasize early diagnosis, treatment, and isolation," he said, drawing applause in adding, "They also were brought under control without the use of HEPA or N95 respirators — which didn't exist then — or expensive respiratory protection programs."

Indeed, APIC attendees appeared to be enthusiastic about the opposition to the standard. "I really believe that it will be delayed, and I would hope then that the scientific review would show — if OSHA is needed at all — where [regulation] is needed," says **Emily Bergman**, RN, CIC, an audience member at the APIC TB session and infection control coordinator in the division of infectious disease at Children's Memorial Hospital in Chicago. "[Due to] the fact that we have already got the numbers dropping, it seems

unnecessary to me to spend the money on something federally."

References

1. Department of Labor. Occupational Safety and Health Administration. Occupational exposure to tuberculosis; proposed rule. 62 *Fed Reg* 54,160-54,307 (Oct. 17, 1997).

2. Centers for Disease Control and Prevention. Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health care facilities, 1994. *MMWR* 1994; 43:(No. RR-13) 1-133. ■

ICPs getting innovative to prove cost-effectiveness

Looking at the forest rather than the trees

In a cost-saving measure that was at once innovative and seemingly heretical, an infection control professional farmed out surveillance duties and eliminated a vacant full-time position in her own department.

"Before you order a psych consult on me, let me tell you why," **Arlene Potts**, MPH, CIC, said recently in Baltimore at the annual conference of the Association for Professionals in Infection Control and Epidemiology. Potts is manager of infection control at Robert Wood Johnson University Hospital in New Brunswick, NJ, where the infection control department was staffed by two full-time ICPs until a co-worker resigned in 1996.

While advertising and interviewing for a replacement, Potts assumed the task of conducting chart review to identify nosocomial infections. In doing so, she noticed that outcomes managers — case managers assigned to every patient admitted to the hospital — were also reviewing and identifying infections and similar adverse events. Observing the duplication of effort, Potts proposed that the infection control position be eliminated and the outcomes managers be formally trained to identify nosocomial infections.

"Needless to say, the proposal was well-received," she said.

The program included establishment of common definitions, a computer software program to compile data, and training of the case managers, she noted. Now the case managers are accurately reporting infections and the elimination of the ICP position saves the hospital $60,000 in salary and benefits annually. The change required $40,000 in start-up costs for the initial development and coding of the computer programs, and the new surveillance system cost the hospital about $10,000 annually thereafter. Thus, the new system results in a net annual savings of approximately $50,000 due to the elimination of the ICP position.

The hospital returns a portion of profits to employees, but job security still would be the obvious benefit of such efforts, even for ICPs that do not have bonus plans, she noted. Even if she finds another ICP position is needed later, the case manager surveillance would likely continue and new infection control staff would assume other duties, Potts tells *Hospital Infection Control*.

"I work for a very supportive institution, and as we are growing they see that I am already spreading myself a little thin with meetings, reports [etc.]," she says. "So there probably will come a day when we are going to need another [ICP] position. But if that comes next year, I've already saved the hospital $150,000."

In another APIC study, **Sanjay Saint**, MD, MPH, a physician in the department of general medicine at the University of Michigan Health System in Ann Arbor, found that silver-alloy catheters can reduce the incidence of urinary tract infections (UTIs) and associated morbidity, mortality, and costs in certain patients.

The catch: The catheters cost $5.30 more apiece than standard designs. Saint looked at the clinical and economic impact of using silver alloy urinary catheters compared to standard devices in a simulated cohort of 1,000 hospitalized patients requiring urethral catheterization for three to seven days. Use of silver-coated catheters led to a 45% decrease in the incidence of symptomatic UTIs, from 21.5 to 12 cases per 1,000 patients. The silver catheters also resulted in a 51% decrease in the incidence of bacteremia from 3.8 to two cases per 1,000 patients compared to standard catheters. In addition to the clinical advantages, use of the catheters resulted in an estimated cost savings of $6.27 per patient, even after accounting for their higher purchase price.

"Hospitals in which the mean duration of catheterization is between three and seven days are likely to see cost savings," he tells *HIC*. "In general, every 1,000 [silver alloy] catheters used prevent 10 symptomatic UTIs and two cases of bacteremia, and save over $6,000. You can extrapolate that." The problem, he concedes, is getting hospital administrators and finance officers to spend more up front to save more later.

"You need to get to someone who is responsible for seeing the big picture — someone at the forest level rather than at the trees level," he says. "Because material services and purchasers are more concerned about making sure when they purchase things that they are less than what they spent last year. They don't see the benefits of preventing catheter-related bacteremia two or three years down the road."

Penny-wise and pound-foolish

However, ICPs must stress the cost benefits of infection prevention if they are to survive in the health care delivery system, said **Denise Murphy**, RN, MPH, CIC, director of infection control at BJC Health System in St. Louis. BJC is a corporation of 13 acute care and six long-term care facilities in Missouri and Illinois. ICPs at the BJC facilities have formed a consortium that emphasizes cost savings and infection prevention.

"Know the impact of nosocomial infections," Murphy emphasized. "Know that bloodstream infections cost greater than $4,000 and add about seven days to the length of stay; that a VRE [vancomycin-resistant enterococci] bloodstream infection can cost between $28,000 and $40,000; that CABG [coronary artery bypass graft] surgical site infections are also very costly — at BJC we have seen them cost between $15,000 and $30,000 routinely. And a vent-associated pneumonia case can cost between $8,000 and $14,000."

While her consortium strives to track and prevent infections on an ongoing basis, Murphy noted that even an outbreak situation provides an opportunity to underscore the importance of preventing such infections in the future. For example, rates for arthroscopy procedures, which typically run .1%, shot up to 2.7% during an outbreak at a BJC hospital in 1997, she noted.

"So we looked at what the average length of stay was for the [infected] cases, and that was 5.2 days, vs. the controls, which was .6 days," she says. "The average cost for the controls was $5,600. The cost of a case that did get infected was $21,000. So the excess cost associated with those arthroscopy SSIs [surgical site infections] was $15,400." Extrapolating that number further, Murphy and consortium members pointed out that preventing a continuation of the epidemic rate over some 600 procedures annually projected out to $231,000 saved.

In developing this kind of cost-effectiveness information, it is critical to focus surveillance efforts on "value-added" data — high-risk, high-cost infections where intervention and prevention efforts can translate to lives and dollars saved. A comprehensive indicator evaluation process led to the selection of surveillance targets for the various facilities in the BJC consortium. For example, surveillance indicators for hospitals of more than 200 beds in the system include CABG SSIs, BSIs in intensive care unit patients, and VRE. Small community hospitals in the system track surveillance indicators that include house-wide BSI rates, SSIs that are historically problematic for them, and both methicillin-resistant *Staphylococcus aureus* (MRSA) and VRE. Long-term care indicators include UTIs, influenza and pneumococcal vaccine compliance, VRE, and MRSA.

"[Selected indicators] had to involve a high-risk population where there was morbidity or mortality involved, or some kind of documented serious clinical indication or epidemiological significance," Murphy said. "And what was really important

More APIC coverage coming next month

See the next issue of *Hospital Infection Control* for our continuing coverage of the 1999 conference of the Association for Professionals in Infection Control and Epidemiology. Look for more reports on cost-effective infection control, an update on HIV issues, the latest findings on antibiotic resistance, and full details on a new nationwide surveillance system for hemodialysis centers as our coverage of the APIC conference in Baltimore continues in the September issue of *HIC*. ■

was that there had to be interventions, either in the literature or that we could come up with, that we believed would impact that indicator so that we could drive the rates down."

For example, interventions used to reduce CABG SSI rates included discontinuation of razor-shaving of surgical sites, better traffic control in operating rooms, and feedback of SSI rates to surgical staff. ■

CDC balks at endorsing surgeon-specific SSI rates

ICPs decide scope of outpatient, discharge tracking

Though some studies report that collecting and reporting surgeon-specific infection rates reduces surgical site infections (SSIs), the Centers for Disease Control and Prevention found insufficient justification to endorse the controversial practice in its recently finalized SSI guidelines.[1]

One recent study attributed considerable cost savings and a 49% reduction of SSIs to surgeon-specific reporting, though even advocates of the practice concede it is not completely understood how the feedback lowers subsequent rates.[2] **(See *Hospital Infection Control*, July 1999, p. 93.)** Such suggestions of efficacy are not compelling enough to specifically endorse the practice, which could unfairly reflect on surgeons who operate on patients at higher risk for infection, notes **Alicia Mangram**, MD, lead author of the guidelines while at the CDC hospital infections program and now in surgical residency at the University of Texas in Houston.

"The studies support that [rates decline] because it makes the surgeon more aware of what is going on in his or her particular practice," she says. "But nobody has [followed] 20 different surgeons, actually looked at their data, and saw that their infection rate was substantially decreased in a statistical fashion using a good prospective controlled study."

Unless all risk variables are accounted for, the practice could simply ascribe a higher infection rate to surgeons who operate on the sickest patients, possibly engendering a reluctance to take such cases among clinicians who know their rates are being collected and compared, she notes. "Does this surgeon really have a higher infection rate, or is [he] operating on patients that are about to die and he is the only one brave enough to take on the challenge?" Mangram asks. "That's the problem. Because there are surgeons we know who will take the really severely ill patients, and they might be the ones that have the high infection rates. It's an unresolved issue, because it won't be looked at fairly."

Nevertheless, the SSI prevention guidelines issued by the CDC Healthcare Infection Control Practices Advisory Committee do not specifically prohibit the practice. **(See rankings, above; guidelines, pp. 105-106.)**

"It doesn't rule it out and doesn't necessarily say that it most be done," says **Ona Baker**, RN, infection control coordinator at the VA Medical

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CDC ranks guidelines for surgical infections

Surgical site infection prevention guidelines by the Centers for Disease Control and Prevention's Healthcare Infection Control Practices Advisory Committee are ranked according to the following system **(see guidelines, pp. 105-106)**:

- **Category IA.** Strongly recommended for implementation and supported by well-designed experimental, clinical, or epidemiological studies.
- **Category IB.** Strongly recommended for implementation and supported by some experimental, clinical, or epidemiological studies and strong theoretical rationale.
- **Category II.** Suggested for implementation and supported by suggestive clinical or epidemiological studies or theoretical rationale.
- **No recommendation; unresolved issue.** Practices for which insufficient evidence or no consensus regarding efficacy exists.[1]

Reference

1. Mangram AJ, Horan TC, Pearson ML, et al. Guideline for prevention of surgical site infection, 1999. *Infect Control Hosp Epidemiol* 1999; 20:257-280. ■

CDC Guidelines for SSI Prevention

1. Preoperative

A. Preparation of the patient

1. Whenever possible, identify and treat all infections remote to the surgical site before elective operation and postpone elective operations on patients with remote site infections until the infection has resolved. *Category IA*
2. Do not remove hair preoperatively unless the hair at or around the incision site will interfere with the operation. *Category IA*
3. If hair is removed, remove immediately before the operation, preferably with electric clippers. *Category IA*
4. Adequately control serum blood glucose levels in all diabetic patients and particularly avoid hyperglycemia perioperatively. *Category IB*
5. Encourage tobacco cessation. At minimum, instruct patients to abstain for at least 30 days before elective operation from smoking cigarettes, cigars, pipes, or any other form of tobacco consumption (e.g., chewing/dipping). *Category IB*
6. Do not withhold necessary blood products from surgical patients as a means to prevent SSI. *Category IB*
7. Require patients to shower or bathe with an antiseptic agent on at least the night before the operative day. *Category IB*
8. Thoroughly wash and clean at and around the incision site to remove gross contamination before performing antiseptic skin preparation. *Category IB*
9. Us an appropriate antiseptic agent for skin preparation. *Category IB*
10. Apply preoperative antiseptic skin preparation in concentric circles moving toward the periphery. The prepared area must be large enough to extend the incision or create new incisions or drain sites, if necessary. *Category II*
11. Keep preoperative hospital stay as short as possible while allowing for adequate preoperative preparation of the patient. *Category II*
12. No recommendation to taper or discontinue systemic steroid use (when medically permissible) before elective operation. *Unresolved Issue*
13. No recommendation to enhance nutritional support for surgical patients solely as a means to prevent SSI. *Unresolved Issue*
14. No recommendation to preoperatively apply mupirocin to nares to prevent SSI. *Unresolved Issue*
15. No recommendation to provide measures that enhance wound space oxygenation to prevent SSI. *Unresolved Issue*

B. Hand/forearm antisepsis for surgical team members

1. Keep nails short and do not wear artificial nails. *Category IB*
2. Perform a preoperative surgical scrub for at least 2 to 5 minutes using an appropriate antiseptic. Scrub the hands and forearms up to the elbows. *Category IB*
3. After performing the surgical scrub, keep hands up and away from the body (elbows in flexed position) so that water runs from the tips of the fingers toward the elbows. Dry hands with a sterile towel and don a sterile gown and gloves. *Category IB*
4. Clean underneath each fingernail prior to performing the first surgical scrub of the day. *Category II*
5. Do not wear hand or arm jewelry. *Category II*
6. No recommendation on wearing nail polish. *Unresolved Issue*

C. Management of infected or colonized surgical personnel

1. Educate and encourage surgical personnel who have signs and symptoms of a transmissible infectious illness to report conditions promptly to their supervisory and occupational health service personnel. *Category IB*
2. Develop well-defined policies concerning patient-care responsibilities when personnel have potentially transmissible infectious conditions. These policies should govern (a) personnel responsibility in using the health service and reporting illness, (b) work restrictions, and (c) clearance to resume work after an illness that required work restriction. The policies also should identify persons who have the authority to remove personnel from duty. *Category IB*
3. Obtain appropriate cultures from, and exclude from duty, surgical personnel who have draining skin lesions until infection has been ruled out or personnel have received adequate therapy and infection has resolved. *Category IB*
4. Do not routinely exclude surgical personnel who are colonized with organisms such as *S. aureus* (nose, hands, or other body site) or group A *Streptococcus,* unless such personnel have been linked epidemiologically to dissemination of the organism in the health-care setting. *Category IB*

D. Antimicrobial prophylaxis

1. Administer a prophylactic antimicrobial agent only when indicated, and select it based on its efficacy against the most common pathogens causing SSI for a specific operation and published recommendations. *Category IA*
2. Administer by the intravenous route the initial dose of prophylactic antimicrobial agent, timed such that a bactericidal concentration of the drug is established in serum and tissues when the incision is made. Maintain therapeutic levels of the agent in serum and tissues throughout the operation and until, at most, a few hours after the incision is closed in the operating room. *Category IA*
3. Before elective colorectal operations in addition to D2 above, mechanically prepare the colon by use of enemas and cathartic agents. Administer non-absorbable oral antimicrobial agents in divided doses on the day before the operation. *Category IA*
4. For high-risk cesarean section, administer the prophylactic antimicrobial agent immediately after the umbilical cord is clamped. *Category IA*
5. Do not routinely use vancomycin for antimicrobial prophylaxis. *Category IB*

2. Intraoperative

A. Ventilation

1. Maintain positive-pressure ventilation in the operating room with respect to the corridors and adjacent areas. *Category IB*
2. Maintain a minimum of 15 air changes per hour, of which at least 3 should be fresh air. *Category IB*
3. Filter all air, recirculated and fresh, through the appropriate filters per the American Institute of Architects recommendations. *Category IB*
4. Introduce all air at the ceiling, and exhaust near the floor. *Category IB*
5. Do not use UV radiation in the operating room to prevent SSI. *Category IB*
6. Keep operating room doors closed except as needed for passage of equipment, personnel, and the patient. *Category IB*
7. Consider performing orthopedic implant operations in operating rooms supplied with ultraclean air. *Category II*
8. Limit the number of personnel entering the operating room to necessary personnel. *Category II*

B. Cleaning and disinfection of environmental surfaces

1. When visible soiling or contamination with blood or other body fluids of surfaces or equipment occurs during an operation, use an EPA-approved hospital disinfectant to clean the affected areas before the next operation. *Category IB* *
2. Do not perform special cleaning or closing of operating rooms after contaminated or dirty operations. *Category IB*
3. Do not use tacky mats at the entrance to the operating room suite or individual operating rooms for infection control. *Category IB*
4. Wet vacuum the operating room floor after the last operation of the day or night with an EPA-approved hospital disinfectant. *Category II*
5. No recommendation on disinfecting environmental surfaces or equipment used in operating rooms between operations in the absence of visible soiling. *Unresolved Issue*

C. Microbiologic sampling

1. Do not perform routine environmental sampling of the operating room. Perform microbiologic sampling of operating room environmental surfaces or air only as part of an epidemiologic investigation. *Category IB*

D. Sterilization of surgical instruments

1. Sterilize all surgical instruments according to published guidelines. *Category IB*
2. Perform flash sterilization only for patient care items that will be used immediately (e.g., to reprocess an inadvertently dropped instrument). Do not use flash sterilization for reasons of convenience, as an alternative to purchasing additional instrument sets, or to save time. *Category IB*

E. Surgical attire and drapes

1. Wear a surgical mask that fully covers the mouth and nose when entering the operating room if an operation is about to begin or already under way, or if sterile instruments are exposed. Wear the mask throughout the operation. *Category IB* *
2. Wear a cap or hood to fully cover hair on the head and face when entering the operating room. *Category IB* *
3. Do not wear shoe covers for the prevention of SSI. *Category IB* *
4. Wear sterile gloves if a scrubbed surgical team member. Put on gloves after donning a sterile gown. *Category IB* *
5. Use surgical gowns and drapes that are effective barriers when wet (i.e., materials that resist liquid penetration). *Category IB*
6. Change scrub suits that are visibly soiled, contaminated, and/or penetrated by blood or other potentially infectious materials. *Category IB* *
7. No recommendations on how or where to launder scrub suits, on restricting use of scrub suits to the operating suite, or for covering scrub suits when out of the operating suite. *Unresolved Issue*

F. Asepsis and surgical technique

1. Adhere to principles of asepsis when placing intravascular devices (e.g., central venous catheters), spinal or epidural anesthesia catheters, or when dispensing and administering intravenous drugs. *Category IA*
2. Assemble sterile equipment and solutions immediately prior to use. *Category II*
3. Handle tissue gently, maintain effective hemostasis, minimize devitalized tissue and foreign bodies (i.e., sutures, charred tissues, necrotic debris), and eradicate dead space at the surgical site. *Category IB*
4. Use delayed primary skin closure or leave an incision open to heal by second intention if the surgeon considers the surgical site to be heavily contaminated (e.g., Class III and Class IV). *Category IB*
5. If drainage is necessary, use a closed suction drain. Place a drain through a separate incision distant from the operative incision. Remove the drain as soon as possible. *Category IB*

3. Postoperative incision care

A. Protect with a sterile dressing for 24 to 48 hours postoperatively an incision that has been closed primarily. Category IB
B. Wash hands before and after dressing changes and any contact with the surgical site. *Category IB*
C. When an incision dressing must be changed, use sterile technique. *Category II*
D. Educate the patient and family regarding proper incision care, symptoms of SSI, and the need to report such symptoms. *Category II*
E. No recommendation to cover an incision closed primarily beyond 48 hours, nor on the appropriate time to shower or bathe with an uncovered incision. *Unresolved Issue*

4. Surveillance

A. Use CDC definitions of SSI without modification for identifying SSI among surgical inpatients and outpatients. *Category IB*
B. For inpatient case-finding (including readmissions), use direct prospective observation, indirect prospective detection, or a combination of both direct and indirect methods for the duration of the patient's hospitalization. *Category IB*
C. When post-discharge surveillance is performed for detecting SSI following certain operations (e.g., coronary artery bypass graft), use a method that accommodates available resources and data needs. *Category II*
D. For outpatient case-finding, use a method that accommodates available resources and data needs. *Category IB*
E. Assign the surgical wound classification upon completion of an operation. A surgical team member should make the assignment. *Category II*
F. For each patient undergoing an operation chosen for surveillance, record those variables shown to be associated with increased SSI risk (e.g., surgical wound class, ASA class, and duration of operation). *Category IB*
G. Periodically calculate operation-specific SSI rates stratified by variables shown to be associated with increased SSI risk (e.g., NNIS risk index). *Category IB*
H. Report appropriately stratified, operation-specific SSI rates to surgical team members. The optimum frequency and format for such rate computations will be determined by stratified case-load sizes (denominators) and the objectives of local, continuous quality improvement initiatives. *Category IB*
I. No recommendation to make available to the infection control committee coded surgeon-specific data. *Unresolved Issue*

Source: Centers for Disease Control and Prevention, Atlanta.
* Federal regulation: OSHA.

(Continued from page 104)

Center in Amarillo, TX. "If it was important but the data wasn't strong, they could have recommended giving surgeon-specific feedback but made it a 'Category II' [ranking], which would mean you have to take it with a grain of salt. I kind of expected that, based on the preponderance of anecdotal reports."

While not endorsing surgeon-specific rates, the CDC recommends that ICPs periodically calculate "operation-specific" SSI rates stratified by risk factors. "We are talking about the rate [for example] of all of the appendectomies performed in the hospital," Mangram says. "Now, of course, most infection control practitioners will break that down into surgeon-specific infection rates, but we're not sure that is data that needs to be distributed. That can be sort of risky business."

Surgeon-specific reporting: 'Unresolved issue'

Indeed, the guidelines assign the ranking of "no recommendation / unresolved issue" to the practice of reporting coded surgeon-specific data to infection control committees. While the recommendation would presumably apply to other committees as well, a direct statement discouraging infection rate disclosures to committees like performance improvement or recredentialing panels might have been helpful to ICPs pressured to disclose such data, adds Baker.

"That's what really causes a conundrum with infection control people and their surveillance data," says Baker, who often speaks on surveillance and outcomes issues at educational conferences. "Not reporting it to the infection control committee in a coded way would not tend to be a big political problem like not passing it on to other committees."

The CDC guidelines also address the tremendous shift to outpatient surgery, noting that an estimated 75% of all operations in the United States will be performed in outpatient settings by the year 2000. While it may be appropriate to use common definitions of SSIs for inpatients and outpatients, the types of operations monitored, the risk factors assessed, and the case-finding methods used may differ.

"At some point in time, I'm sure we're going to have data comparing ambulatory-setting surgical site infections with inpatient-setting SSIs," Mangram says. "There is going to be a statistical difference between the two, because the patients who have ambulatory care surgical procedures performed have decreased risk."

Though many outpatient infections are likely to be relatively minor, it is still important to track ambulatory procedures, Mangram adds. "Despite our own intuition telling us that the number of SSIs in the outpatient population is going to be substantially smaller, we could be wrong. What we may find is that there are no deep organ / space surgical site infections, but the number of superficial site infections may not be any different [than inpatient] and they may be something we need to know. So I think it will be important."

How can outpatients be tracked?

But surveillance for such procedures is difficult, she says, noting that it is hard enough to keep track of hospitalized patients post-discharge. "The chances that [outpatients] will even go back to the surgeon other than to have their sutures removed are minimal," she says. "They will go to their primary care physician. So I think surveillance in the ambulatory care setting is going to be difficult." Possible surveillance methods for ambulatory procedures include pharmacy approaches that track patients who receive antibiotics postoperatively, and microbiological systems that red-flag patients who have cultures sent in for testing, she adds.

"You probably wouldn't devote the same resources, but my impression from a lot of experts is that it would be a mistake to totally eliminate that [outpatient] element of the surveillance," Baker says. "You just miss too big of the proportion of [procedures] and the opportunity to look at performance. Even if they are at perhaps lower risk for severe outcome, any one of them has the potential to result in a severe outcome."

Baker also reminds that surveillance for outpatient procedures should not be confused with post-discharge surveillance for surgical inpatients. "These are hospitalized patients who had their procedures inpatient," she says. "You still need to follow those, [because] those very well could be fairly high-risk procedures like cardiovascular and major orthopedic procedures that tend to present late with infections. You can't lump post-discharge surveillance in with ambulatory surgery surveillance in terms of how you do your resource assignments."

A variety of surveillance approaches is being

Assess risk for SSI in patients, procedures

Despite advances in infection control in operating rooms, surgical site infections (SSIs) remain a substantial cause of morbidity and mortality among hospitalized patients, the Centers for Disease Control and Prevention reports.

Surgical site infections are the third most frequently reported nosocomial infection, accounting for 14% to 16% of all nosocomial infections among hospitalized patients, the CDC notes.[1] During 1986 to 1996, CDC sentinel hospitals followed 593,344 operations and found that 15,523 (2.6%) were complicated by an SSI. Of those SSIs, two-thirds were confined to the incision, and one-third involved organs or spaces accessed during the operation. When surgical patients with nosocomial SSIs died, 77% of the deaths were reported to be related to the infection. The majority of fatal infections involve organs or spaces accessed during the operation.

Continuing problems with SSIs may be explained in part by increasing severity of illness in elderly, immune-compromised patients and the emergence of antimicrobial-resistant pathogens. In that regard, the new CDC SSI guidelines emphasize that routine use of vancomycin — a last-line drug facing dwindling efficacy against some pathogens — is not recommended as prophylaxis for any kind of operation. However, vancomycin prophylaxis may be appropriate in certain clinical circumstances, such as when a cluster of methicillin-resistant *Staphylococcus aureus* mediastinitis has been detected.

"We thought it was only prudent that we speak to this issue, especially in regard to vancomycin," says **Alicia Mangram**, MD, lead author of the guidelines while at the CDC hospital infections program and now in surgical residency at the University of Texas in Houston. "[We] tried to make a strong statement that we don't want to have surgeons overusing prophylactic drugs."

Overall, the guidelines emphasize basic infection prevention principles and minimizing risk where possible, she notes. "Prior to planning an elective operation, look at the risk factors that we have mentioned and see if there is anything that can be done to change them," she recommends. While ICPs should consult the CDC SSI guidelines for specific guidance on particular factors, the following were listed as the prime characteristics that can contribute to SSI development:

- **Patient risk factors:** Age, nutritional status, diabetes, smoking, obesity, coexistent infections at a remote body site, colonization with microorganisms, altered immune response, and the length of preoperative stay.
- **Operation risk factors:** Duration of surgical scrub, skin antisepsis, preoperative shaving, preoperative skin prep, duration of operation, antimicrobial prophylaxis, operating room ventilation, inadequate sterilization of instruments, foreign material in the surgical site, surgical drains, surgical technique (i.e., poor hemostasis, failure to obliterate dead space, tissue trauma).

Reference

1. Mangram AJ, Horan TC, Pearson ML, et al. Guideline for prevention of surgical site infection, 1999. *Infect Control Hosp Epidemiol* 1999; 20:257-280. ■

tried to capture post-discharge infections, but as with outpatient SSIs, the CDC concluded there is no consensus approach to recommend. The final guidelines for SSI prevention essentially advise infection control professionals to weigh their local situation and available resources in adopting the most feasible and effective method to track post-discharge and outpatient infections. Regardless of the approach taken, the CDC recommended using its definitions for SSIs without modification in both inpatient and outpatient settings. As integrated health information systems expand, tracking surgical patients through the course of their care may become more feasible, practical, and effective, the CDC states.

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1. Mangram AJ, Horan TC, Pearson ML, et al. Guideline for prevention of surgical site infection, 1999. *Infect Control Hosp Epidemiol* 1999; 20:257-280.

2. Smyth E, Barr J, Webb C, et al. Potential savings achieved due to a reduction in surgical site infections over a twenty-four month period. Abstract 58. Presented at the annual conference of the Society for Healthcare Epidemiology of America. San Francisco; April 18-20, 1999. ■

Ontario ICPs battle epidemic MRSA strain

'It wasn't there, and then it was there'

Infection control professionals in Ontario, Canada, are locked in an all-out effort to eradicate an epidemic strain of methicillin-resistant *Staphylococcus aureus* (MRSA) as besieged hospitals in the province continue to screen incoming patients and implement isolation and decolonization protocols.

In unofficial totals for 1998 (the most recent data available), some 8,000 patients in the province screened positive for MRSA, including some 950 who had clinical infection. The total is up from a reported 6,866 Ontario patients who were colonized or infected with MRSA in 1997, a 61% increase over 1996 and a 12-fold increase over the province's rates in the early 1990s. Officials estimate that 85% to 90% of all the MRSA in the province is from a single strain, which is being called the Ontario epidemic clone and CMRSA-1. In a reaction that underscores how dramatic the increase has been in the last few years, Ontario ICPs are somewhat encouraged that the increase from 1997 to 1998 was only in the 14% range.

Screening pays off

"We were more than quadrupling from year to year," says **Karen Green**, RN, CIC, infection control coordinator at Mount Sinai Hospital in Toronto. "Last year, we had a marginal increase, so the curve is starting to diminish. There is reason to believe that the aggressive measures we are taking are starting to pay off. Most of the cases we are picking up are through [admission] screening. If we weren't doing screening and implementing precautions, our ratio of clinical cases may in fact be much higher."

Indeed, while some United States hospitals have reluctantly accepted an endemic level of MRSA and few screen patients on admission, Canadian ICPs are hopeful that a united effort by all health facilities can eradicate the pathogen.

"This is not an endemic organism; this is an epidemic organism," Green says. "If you can get it out, you should be able to get rid of it. I continually have these discussions with my colleagues around the world. When you can give me a definition of endemic which is not measured by your inability to put resources into [eradication], then we will talk about endemic vs. epidemic. But telling me you have too many cases to do anything about it does not [mean] it is endemic."

The model for a successful widespread eradication of MRSA is Denmark, where epidemic strains have been eliminated by a nationwide effort, Green notes. **(See *Hospital Infection Control*, May 1999, pp. 65-66.)** "We think that we can be as successful as Denmark was in eradicating this bug," Green says. "It just means everybody has to work really hard at it. You can't do it by two or three hospitals being aggressive when you have a province-wide epidemic."

Strain likely in U.S. as well

The Ontario epidemic strain is almost certainly in U.S. hospitals as well, as the first case in Ontario is thought to have originated in a patient transferred from the U.S. in 1995, she says. However, in the absence of aggressive screening measures for colonization, the pathogen would not likely stand out from the many strains in circulation in the United States, she adds.

"You just wouldn't notice it as much because you have so many other strains and [ICPs] don't necessarily look in the same way," she says. "We had the luxury of having next to none, and then seeing this kind of really strange thing unfold very quickly."

Indeed, the spread of the organism has been particularly dramatic because health care facilities in the province had virtually no MRSA when it first appeared. The rapid spread across Ontario has been documented through surveys of laboratories and ICPs. In the most recent results from February 1998, 114 (84%) of the 136 labs responding (99 hospital-based, 25 private, and 12 public health) reported the identification of at least one MRSA patient.[1]

An initial problem was that not all laboratory testing kits picked up the strain, resulting in false-negative results and false positives for coagulase-negative staphylococcus, explains **Barbara Willey**, ART, a laboratorian in the infection control and methods development department at Mount Sinai. Lab problems were further complicated by the fact that Ontario laboratorians were not used to seeing MRSA and had a low index of suspicion for the pathogen, Willey notes. Suspicions have certainly been raised now, and new lab kits and more extensive retesting protocols have assured that few isolates are

being missed.

"The organism masqueraded as a coag-negative, and it still does to an extent," Willey says. "The problem wasn't necessarily recognized early enough. [And] there wasn't enough buy-in initially to the fact that you actually had to control it because there had never been a situation before where a strain moved so quickly. Because this strain covered the province. It wasn't there, and then it was there."

Labs scramble to keep up

In a finding that U.S. counterparts can empathize with, Willey says lab identification efforts may also be hampered by health care restructuring and budget cuts that have made it difficult for lab workers to keep up with the massive screening effort. "There is more work because there is more and more screening," she says. "We used to run like one, two, or three MRSAs a year. MRSA used to be an event. Now it is like one to three a week."

Although it is labor-intensive, the screening effort triggers a series of infection control and decolonization measures that are the best hope to bring the pathogen to bay. The screening effort by many ICPs in Ontario includes getting cultures on admission from any patient who is being transferred directly from another facility, has had an overnight admission to any health care facility in the preceding six months, or was previously known to be colonized or infected with an antibiotic-resistant organism. Canadian health officials recommended swabbing multiple sites, including the nares, open wounds/drainage sites, and perineum or rectum. Following such recommendations will allow the identification of more than 93% of patients colonized with MRSA, officials estimate.

Patients who test positive on admission are placed in isolation precautions, with workers donning barrier protection similar to contact precautions for antibiotic-resistant pathogens in the United States. Patients are placed in a single room if possible and in cohorts if necessary, Green says. "We also do contact tracing, so when we identify a case [after admission], we do a series of screens on the roommate to make sure that they haven't picked it up," she adds.

Most of the cases identified represent MRSA colonization, and a decolonization protocol that includes mupirocin ointment in the nares and chlorhexidine baths or showers is implemented to prevent subsequent transmission and possible clinical infections. "There is no question that when you identify a colonized patient at admission as opposed to a week or two into their hospitalization that your rates of transmission are much lower," Green says, estimating that colonization is being cleared in about 60% of cases. "You'll get an initial good response, but then as you follow them over time, there is a percentage that will reacquire or recolonize," she says.

A voice in the wilderness

Though noting that some U.S. hospitals are beginning to successfully screen on admission for MRSA and vancomycin-resistant enterococci, Green says it has been an uphill fight to justify the practice. **(See *HIC*, March 1999, p. 36.)**

"Sometimes we feel like the lone voice in the wilderness because it is not just convincing colleagues south of the border," she says. "It is has been a lot of work with the rest of the country. [Canadian ICPs] that aren't dealing with this particular strain fail to appreciate it. They just [wonder] how we can be that aggressive? But when you go from two cases a year to suddenly 50 to 70, that is mammoth change in how you approach everything."

Reference

1. Green K, McGeer A, Fleming CA. MRSA and VRE in Ontario —an update. *Laboratory Proficiency Testing Program Newsletter* 1998; 240:1-3. ■

COMING IN FUTURE MONTHS

- More coverage of the APIC conference in Baltimore
- Continuing challenges in HIV postexposure prophylaxis
- Can the OSHA TB standard be derailed?
- Safety and cost issues in the reuse of disposables
- Special focus: Infection control issues in long-term care

JOURNAL REVIEWS

Richards MJ, Edwards JR, Culver DH, et al. **Nosocomial infections in pediatric intensive care units in the United States.** *Pediatrics* 1999; 103:e39.

A mean overall patient infection rate of 6.1% was found in this study of data collected between January 1992 and December 1997 from 61 pediatric intensive care units (PICUs) in the United States. The study used the standard surveillance protocols and nosocomial infection site definitions of the Centers for Disease Control and Prevention's National Nosocomial Infections Surveillance system.

"Our analysis suggests that the epidemiology of nosocomial infections in PICUs differs from that seen in other critical care areas," the authors found. "The distribution of infection sites lies between what we have previously reported in neonatal ICUs and adult medical ICUs."

Primary bloodstream infections were the most common sites of infection, followed by pneumonia and urinary tract infections (UTIs). In adult medical ICUs, UTIs were most frequently reported. In neonatal ICUs, bloodstream infections were an even greater proportion of all infections than in pediatric units. "We saw a transition between the patterns with age, although bloodstream infections remain the most frequent nosocomial infections in adolescents," they conclude. Device-associated infection rates are the best rates currently available for comparisons between units, because they are not associated with length of stay, the number of beds in the hospital, or season.

Data on 110,709 patients with 6,290 nosocomial infections were analyzed. Primary bloodstream infections (28%), pneumonia (21%), and urinary tract infections (15%) were most frequent and were almost always associated with use of an invasive device. Primary bloodstream infections and surgical site infections were reported more frequently in infants aged two months or less than in older children. UTIs were reported more frequently in children more than five years old than in younger children. Coagulase-negative staphylococci (38%) were the most common bloodstream isolates, and aerobic gram-negative bacilli were reported in 15% of primary bloodstream infections. *Pseudomonas aeruginosa* was the most common species reported from pneumonia (22%) and *Escherichia coli* the most common from urinary tract infections (19%). *Enterobacter* species were isolated with increasing frequency from pneumonia and were the most common gram-negative isolates from bloodstream infections.

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Rao VK, Iademarco EP, Fraser VJ, et al. **Delays in the suspicion and treatment of tuberculosis among hospitalized patients.** *Ann Intern Med* 1999; 130:404-411.

Nosocomial transmission of tuberculosis can result from delays in the suspicion and treatment of TB among hospitalized patients, the authors warn. Despite increased awareness of TB, delays in management appear to be common, due in part to a decline in TB expertise among physicians

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trained in the post-sanitarium era. Other studies have underscored that management errors are common and may contribute to the emergence of drug-resistant TB, they remind.

The authors found that over a three-year period at their hospital, 25 patients were identified by the infection control department as the source of TB exposures to 598 health care workers. "In these patients, a diagnosis of tuberculosis was not considered at admission and initiation of isolation and treatment was delayed," they noted. Delays in initiation of treatment were more common than delays in the initial suspicion of TB, but both types of delays were common, even in patients with disease that was confirmed by a positive smear.

"These delays illustrate a need for improved education of physicians about the benefits of early initiation of therapy for tuberculosis," they advise.

Researchers: Screen all admissions

To assist in clinical decision making, they recommend:

• All patients admitted to the hospital should undergo prompt assessment of their risk for active TB. The stringency of this assessment must be based on the prevalence of TB among hospital admissions.

• Patients in whom the diagnosis is suspected must be placed in respiratory isolation immediately, and diagnostic studies, including chest radiography, collection of sputum for acid-fast smear and culture, and tuberculin skin testing must be done in the first 24 hours of hospitalization.

• The timing of initiation of treatment is less straightforward and must rely on the clinical judgment of the treating clinician. However, certain guiding principles are applicable. Treatment for TB should be started immediately in all cases in which acid-fast organisms are present on smears unless infection with a non-TB mycobacterial species has been confirmed and the diagnosis of TB has otherwise been excluded.

• In addition, patients whose chest radiographs or symptoms are highly suggestive of TB should also begin antituberculous therapy while results of smears are awaited. In high-risk patients with negative smears, treatment should be continued until final culture results are available or further diagnostic studies are undertaken. ■

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. ■