Editorial

Improved Understanding and Control of Nosocomial Methicillin-Resistant Staphylococcus aureus: Are We Overdoing It?

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Back in the late 1970s and early 1980s, the conceptual framework for controlling methicillin-resistant *Staphylococcus aureus* (MRSA) was relatively simple, straightforward, and aggressive. The MRSA "problem" was confined to large teaching institutions and caused extensive outbreaks with major associated morbidity. Nosocomial acquisition and transmission of the organism was assumed because community-acquired infection was rare, stringent isolation precautions to contain the patient and the organism were practiced widely, laboratories were inundated with hundreds of surveillance cultures labelled "rule out MRSA," and patient and healthcare worker decontamination to eliminate the MRSA Marvins of the world was in vogue.

This writer admits to being among a SWAT team of young investigators sent forth to stamp out MRSA in the hinterlands where salmon filled the rivers and streams. We even claimed some degree of success.[1] Most of the salmon and salmon fishermen are now gone. Why? We are told it's because of the "overs'-overfishing, overdamming, overlogging, overpolluting, overcompeting, and too many sea lions. More MRSA than ever is with us.[2,3] Why? Could it be because of, rather than despite, the overs-oversimplification, over-interpretation, overconcern, overculturing, over-surveillance, overisolation, overtreatment, overdisinfection, and overdecontamination? Will we, rather than MRSA, go the way of the salmon and salmon fishermen because of the overs? What have we learned, and how can we be better, more efficient, and more cost-effective before disappearing?

The report in this issue of *Infection Control and Hospital Epidemiology* by Lugeon and colleagues* informs us once again that the questions and answers about MRSA prevention and control are controversial. Based on this and many other studies, including two that appeared recently in this journal,[5,6] it is obvious that the term "nosocomial MRSA" needs careful interpretation. Out-of-hospital MRSA colonization now should be accepted as a norm rather than an exception, accounting for 20% to 62% of cases in these three reports.[4-6] A large proportion of community cases were not identified as high risk for MRSA carriage by information available at the time of admission, such as intravenous drug abuse, transfer from an extended-care facility, recent antibiotic therapy, or hospitalization within the preceding month. Thus, establishing early and special MRSA-related controls for most culture-positive patients through a selective program to obtain cultures on admission is not possible.

These same reports,[4-6] using one of the more discriminatory molecular typing tests for MRSA strain or clone identification and delineation, demonstrated a high degree of strain heterogeneity among patients with nosocomial MRSA colonization and infection, including many nosocomial case isolates with unique types. Except for epidemiologic associations among

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In order that readers be aware of any potential conflict of interest, Dr. Hartstein wishes to note that he has directed a molecular typing laboratory serving his hospital's infection *control* departments and offering reference *laboratory typing services* since *1989.*

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affected patients in combination with clear evidence of strain relatedness, there is little to justify an assumption that MRSA truly are acquired or transmitted within the hospital setting on a frequent basis.

Keeping these facts in mind and trying to address efficiency and cost-effectiveness, we must state lucidly the questions being asked. If the question is "Is cross-infection occurring?", a combination of reasonable epidemiologic review of cases and case isolate typing by a discriminatory typing test is in order. In the study by Lugeon et al,[4] nosocomial case isolates from sporadically identified patients that were found to be unique by typing were indicative of either the absence of cross-transmission or the presence of single-patient acquisitions of highly questionable epidemiologic relevance. Outbreaks in the dermatology and ENT units were suggested strongly by a major rise in the prevalence of nosocomial MRSA cases and later were confirmed by ribotyping. All of the smaller epidemiologic clusters and pseudoclusters required ribotyping for identification and confirmation in this institution with endemic MRSA.

On occasion, type-identical isolates predominate among endemic nosocomial MRSA cases that are not obviously epidemiologically linked, such as the sporadic MRSA cases of ribotype 1 in the Lugeon et al report.4 Whether such isolates are being cross-transmitted can be investigated further. One strategy is to type a series of contemporaneously derived isolates from the institution's patients with community-acquired infections. Finding the same predominant type among community-acquired isolates is supportive of the concept that sporadic nosocomial cases likely represent community acquisition of MRSA with delayed culturing and identification after patient admission. As a different or additional option, nosocomial isolates of the same predominant type from patients without epidemiologic associations can be typed by an alternative molecular method. Despite marked improvement in discriminatory power demonstrated by many molecular typing methods,[7,8] MRSA isolates from geographically diverse areas are thought to be derived from a limited number of genomically distinct clones.[9] The use of more than one typing test may be needed to identify the presence of true strain differences (confirming an absence of cross-infection) .[7,8] Rarely, careful case-control studies may be useful and reveal less apparent, but very important, epidemiologic connections among nosocomial cases caused by type-identical strains (confirming unsuspected cross-infection).'O

Hundreds of literature citations contradict the impression that molecular typing is unavailable. I also am aware of at least four laboratories offering molecular typing services at a per-isolate charge approximating the fee for a single blood culture. These laboratories promise typing results within days to a few weeks. In my opinion, epidemiologists and infection control practitioners are now charged with the responsibility to request wisely and cost-effectively these tests whenever an accurate answer to the cross-infection question is needed.

After addressing cross-infection, the next question is "What should be done about nosocomial MRSA?" Lugeon et al and some British societies favor extremely aggressive and multifaceted approaches to prevent and control endemic and epidemic MRSA.[4,11] Such aggressive approaches have not been demonstrated by controlled intervention trials to be more effective than simpler containment strategies. In addition, advocacy of these (? over-) zealous approaches has not limited the spread or decreased the prevalence of MRSA in the United States3s4 and elsewhere. Lastly, vigorous containment and prevention activities are very expensive; disruptive of overall care; unpleasant for, and not necessarily in the best interest of, affected patients; likely to extend acute-care hospital stay; inducers of more antimicrobial resistance; at odds with unique goals of different facilities; and commonly unsuccessful.

I favor the much more reasonable and flexible approaches advocated by two groups of experienced and thoughtful people.[12,13] For those who persist in counting upon epidemiologic assessment without isolate typing, and in the practice of the overs, I predict that, like the salmon and salmon fishermen, you will disappear long before MRSA infections are prevented or controlled.

I close these remarks by minimally paraphrasing the thoughts of Dr. John McGowan, originally directed at other contentious issues surrounding a different nosocomial pathogen:[14]

The key to dealing with all aspects of MRSA, as with other nosocomial infections, is fitting the control activities to the specific situation. To this end, the article in this issue performs a valuable service. It reminds us that efficient and effective solutions to hospital and healthcare problems should be generated at the local level rather than by national mandates or national recommendations for uniform approaches.*

REFERENCES

1. Ward TT Winn RE, Hartstein AI, Sewell DL. Observations relating to an inter-hospital outbreak of methicillin-resistant *Staphylococcus aureus:* role of antimicrobial therapy in infection control. *Infect Control* 1981;2:453-459.
2. Boyce JM. Increasing prevalence of methicillin-resistant *Staphylococcus* aureus in the United *States. Infect Control Hasp Epidemiol* 1990;11:639-642.
3. Panlilio AL, Culver DH, Gaines BP, et al. Methicillin-resistant *Staphylococcus* aureus in U.S. hospitals, 1975-1991. *Infect Control Hasp Epidemiol* 1992;13:582-586.

4. Lugeon C, Blanc DS, Wenger A, Francioli P Molecular epidemiology of methicillin-resistant Staphylococcus aureus at a low-incidence hospital over a four-year period. *Infect Control Hosp Epidemiol* 1995;16:260-267.
5. Embil J, Ramotar K, Romance L, et al. Methicillin-resistant Staphylococcus aureus in tertiary care institutions on the Canadian prairies 1990-1992. *Infect Control Hosp Epidemiol* 1994;15:646-651.
6. Layton MC, Hierholzer WJ, Patterson JE. The evolving epidemiology of methicillin-resistant *Staphylococcus* aureus at a university hospital. *Infect Control Hosp Epidemiol* 1995;16:12-17.
7. Mulligan ME, Arbeit RD. Epidemiologic and clinical utility of typing systems for differentiating among strains of methicillin-resistant *Staphylococcus aureus. Infect Control Hosp* Epidemiol 1991;12:20-28.
8. Tenover FC, Arbeit R, Archer G, et al. Comparison of traditional and molecular methods of typing isolates of *Staphylococcus aureus. J Clin Microbiol* 1994;32:407-415.
9. Kreiswirth B, Kornblum J, Arbeit RD, et al. Evidence for a clonal origin of methicillin resistance in *Staphylococcus aureus. Science* 1993;259:227-230.
10. Boyce JM, Opal SM, Potter-Bynoe G, Medeiros AA. Spread of methicillin-resistant *Staphylococcus* aureus in a hospital after exposure to a health care worker with chronic sinusitis. *Clin Infect Dis* 1993;17:496-504.
11. Report of a combined working party of the Hospital Infection Society and British Society for Antimicrobial Chemotherapy. Revised guidelines for the control of epidemic methicillin-resistant *Staphylococcus aureus. J Hasp Infect* 1990;16:351-377.
12. Mulligan ME, Murray-Leisure KA, Ribner BS, et al. Methicillin-resistant *Staphylococcus* aureus: a consensus review of the microbiology, pathogenesis, and epidemiology with implications for prevention and management. *Am J Med* 1993;94:313-328.
13. Boyce JM, Jackson MM, Pugliese G, et al. Methicillin-resistant *Staphylococcus* aureus (MRSA): a briefing for acute care hospitals and nursing facilities. *Infect Control Hosp Epidemiol* 1994;15:105-113.
14. McGowan JE Jr. Hospital tuberculosis: beyond the inner city. *Infect Control Hosp Epidemiol* 1994;15:510-512.

EPA's Proposed Regulations Could Shut Down Majority of Hospital Incinerators

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EPA recently published proposed rules on medical waste incinerators that hospitals say would be overly restrictive without providing significant benefit to the public health or environment. The definition of medical waste in the proposed rule would include virtually all waste generated in healthcare and research facilities, resulting in increased volume and cost of medical waste. EPA also has proposed that new and existing medical waste incinerators, regardless of size or type, meet the same stringent emission limits, going far beyond the limits intended under the Clean Air Act Amendments. Moreover, these emission limits also exceed the current requirements of more than 40 states' environmental agencies. In addition, the proposal would impose strict compliance performance testing of emissions and specific training and qualification requirements for incinerator operators that would need to be reviewed by independent agencies. Experts estimated that these proposals may result in closure of 80% of hospital incinerators.

These proposed incinerator regulations are part of a long-standing battle between healthcare facilities and the EPA. In a September 1994 report released by the EPA, medical waste incinerators were identified as the major source of dioxin pollution. A special expert panel of the American Hospital Association (AHA), convened to respond to the EPA report, released data in early January 1995 that showed that medical waste incinerators contributed to 0.2% of total toxic equivalents and 1.5% of the known sources of dioxin, and not 55% as the EPA claimed.

A public hearing on the proposed incinerator regulations was scheduled to be held on March 28, 1995, and comments on the proposal were due on April 28, 1995. EPA does not plan to issue the final regulations until April 1996. Copies of the 240-page proposed rule may be obtained from the EPA at (202) 260-7548.

FROM: EPA Proposed rules on medical waste incinerators. *Federal Register* (60):10653; February 27, 1995.

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