

Cost of Antibiotic Resistance Hits Private Payers

BY MIRIAM E. TUCKER

BETHESDA, MD. — The overall cost burden of antimicrobial resistance—as high as \$38 billion in one 2009 hospital estimate—has shifted sharply from Medicare to private payers over the last decade.

Medicare still pays the majority of the costs for excess length of stay, increased use of more expensive drugs, and poorer health attributable to treatment-resistant infections. But the rise in infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA), which largely affects younger, healthier individuals, has meant that the overall cost per patient has declined but more is being borne by private HMOs and PPOs, Susan D. Foster, Ph.D., said at the 2010 Conference on Antimicrobial Resistance sponsored by the National Foundation for Infectious Diseases.

“There’s been a major shift in who’s actually paying. I don’t think the insurance companies are quite aware of this,” said Dr. Foster, professor of international

health at Boston University and director of public policy and education for the Alliance for the Prudent Use of Antibiotics at Tufts University, Boston.

Dr. Foster analyzed data from three studies. In an unpublished study, she and her associates reviewed Massachusetts hospital discharge data from 2000 to 2007 to look for ICD9 “VO9” codes, which are specific for drug-resistant infections. Although these codes are complex and difficult to use and therefore represent a study limitation, they do allow for analysis of trends over time, she explained.

Overall, the number of hospital discharges reporting antibiotic resistance in Massachusetts rose from 3,861 in 2000 to 11,218 in 2007. The inflation-adjusted total cost more than doubled over the 7 years, from \$135 to \$285 million. However, the length of stay (LOS) per patient for drug-resistant infections dropped by 4.5 days, and the cost per patient fell by nearly \$10,000.

In contrast, the length of stay for drug-susceptible infections didn’t change during the study period (just under 5 days), while the cost per patient with susceptible infections rose only slightly.

The drop in LOS and cost per patient with drug-resistant infections is largely explained by the dramatic shift in patient age, particularly among 19- to 64-year-olds: In 2000, that age group accounted for 30% of drug-resistant infection discharges, whereas in 2007 the proportion had risen to 45.5%. At the same time, the 65- to 80-year-old group dropped from 38% to 25%. While the proportion of infections due to drug-resistant organisms rose in all age groups, the greatest rise was among working-age adults, Dr. Foster noted.

Not surprisingly, then, was the concurrent payer shift: Medicare’s proportion of the cost dropped from 73% in 2000 to 58% in 2007, while Medicaid’s rose from 6% to 15%. The proportion paid by “Other,” including private insurance, rose from 20.5% to 28%, she said.

Also not surprising—but perhaps not considered previously—were declines in inpatient mortality due to drug-resistant infections (from 11% to 5%) and in discharge of patients to nursing homes (32% to 28%), and a rise in pa-



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DR. FOSTER

tients returning home from the hospital (33% to 48%).

The second study, conducted by Dr. Rebecca Roberts and her associates for the Chicago Antimicrobial Resistance Project, analyzed discharge data at Cook County Hospital for a random sample of 1,391 high-risk (more than five ICD-9 codes, excluding trauma, burn, or obstetric care) adult patients, of whom 13.5% (188) had an antibiotic-resistant infection (ARI). Societal costs for the study year 2000 were estimated at \$10.7-\$15 million, or \$13.35 million in 2008 dollars (Clin. Infect. Dis. 2009;49:1175-84).

In that study, LOS was three times longer for patients with ARIs (24 vs. 8 days) and mortality 6 times higher (18% vs. 3%). Total inpatient costs were \$58,029 vs. \$13,210 for non-ARI patients. Even the daily cost was \$517 greater for the ARI group, Dr. Foster noted.

The most common type of ARI was MRSA (43%), followed by vancomycin-resistant enterococci (VRE, 31%), *Escherichia coli*/Klebsiella species (16%), and multiple infections (6%). By cost, however, VRE accounted for the greatest proportion (36%), followed by MRSA

(34%), and multiple infections (16%).

After publication of the study, Dr. Foster collaborated with Dr. Roberts in extrapolating the Chicago data to the entire United States: In 2000, there were 900,000 admissions with the same criteria the study used. Applying the costs found in that study gives \$16.6-\$26 billion in additional health care costs (the range reflects different inflation adjustments). Updating the figure to 2009 costs using the Consumer Price Index gives an estimated \$21-\$34 billion, while using medical inflation rates boosts the figures to as high as \$24-\$38 billion.

The third study, also unpublished work by Dr. Foster and her associates, was an Internet-based survey of more than 300 respondents recruited from MRSA chat rooms, listservs, and Google Adwords. Acknowledging the limitations of such surveys—particularly the bias toward younger, healthier Internet users with strong opinions—she described “some heart-rending responses,” including one from a 52-year-old woman who felt completely isolated from friends and family, a teacher who was fired when her MRSA diagnosis became known, and parents who felt they had to send their children away to prevent transmission.

Respondents reported a mean out-of-pocket expenditure of \$2,251, including copays for office visits, prescription drugs, and hospital stays. Nearly 70% reported having private insurance (HMO or PPO), and 14% said they were uninsured, which is close to the national average, Dr. Foster said. “Individuals and households affected by drug resistance bear a large uncompensated burden in terms of out-of-pocket expenses and lost wages.” ■

A related video is at www.youtube.com/HospitalistNews (search for 72274).

VITALS

Major Finding: The cost of antimicrobial resistance is rising, but many patients now are younger and living longer, so the burden is shifting from Medicare to private insurance.

Data Source: Two studies assessing hospital data and one Internet survey.

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Lactate Clearance Measure Simplifies Severe Sepsis Therapy

BY MARY ANN MOON

A simpler method to monitor tissue oxygenation in severe sepsis led to short-term survival rates similar to those of the standard approach, and could ease initial management of critically ill patients, according to a report in JAMA.

Central venous oxygen saturation (ScvO₂) monitoring is the third step in the protocol for early goal-directed therapy in severe sepsis, which is a complicated strategy for titrating intravenous fluids, pressors, inotropes such as dobutamine, and transfusions to quickly correct the imbalances associated with the disorder. With that approach, ScvO₂ monitoring is used to assess whether dobutamine or red blood cell transfusions are restoring tissue oxygen delivery to a target value of at least 70%.

But ScvO₂ monitoring is technically difficult, requiring expertise and special equipment that are not available in many emergency departments, the investigators noted, as well as “real-time calibration and troubleshooting

that can divert attention from the patient.” A simpler and more generalizable method for monitoring the adequacy of tissue oxygen delivery is needed, said Dr. Alan E. Jones of the emergency department at Carolinas Medical Center, Charlotte, N.C., and his associates.

The researchers proposed using lactate clearance as such an alternative. Clearance of serum lactate is derived by calculating the change in lactate level from two blood specimens drawn at different times. A clearance of at least 10% can be used as a marker of adequate tissue oxygen delivery.

Dr. Jones and his colleagues performed a prospective, non-blinded clinical trial comparing the two methods in 300 patients who presented with severe sepsis or septic shock at emergency departments in three large urban medical centers. The study subjects were randomly assigned in equal numbers to receive either ScvO₂ (central) monitoring or lactate clearance (serum) monitoring.

The primary end point of the study—the absolute in-hospital mortality rate—slightly favored the lactate

clearance method (17% mortality) over ScvO₂ (23% mortality). Thus, the less-invasive method was found to be noninferior, the investigators reported (JAMA 2010;303:739-46). “These data support the substitution of lactate measurements in peripheral venous blood as a safe and efficacious alternative to a [centrally placed] computerized spectrophotometric catheter in the resuscitation of sepsis,” they said.

Early goal-directed therapy and its constituent components “are currently being reevaluated in a number of large prospective clinical trials,” noted Dr. Roger J. Lewis of Harbor-UCLA Medical Center, Los Angeles, in an editorial comment. The study “is an important first step to identifying less burdensome approaches to the initial management of critically ill patients with severe sepsis and septic shock,” he wrote (JAMA 2010;303:777-9). ■

Disclosures: The study was supported by grants from the National Institutes of Health. Dr. Jones reported receiving research support from Critical Biologics Corp. and Hutchinson Technology Inc., and serving on an advisory board for Brahms Inc. and Siemens. Dr. Lewis chairs the data and safety monitoring board for the Protocolized Care for Early Septic Shock trial funded by NIH, and serves as a consultant to Berry Consultants LLC.

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