

Surgical Infection Society: We Endorse Antimicrobial Stewardship We Stand by Our International Colleagues and Societies in the Fight for Proper Antimicrobial Therapy

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EARLIER THIS YEAR, the first death in the United States involving a pan-resistant *Klebsiella pneumoniae* was reported in a patient in whom sepsis developed from a surgical site infection [1]. This case highlights the growing importance of antibiotic resistance to surgeons and their patients. In support of the 2017 U.S. Antibiotic Awareness Week [2], members and officers of the Surgical Infection Society (SIS) are championing the proper usage of antibiotic agents and partnering with the centers for Disease Control and Prevention (CDC), the Global Alliance for Infections in Surgery, and the World Society of Emergency Surgery in attempting to elevate each surgeon's commitment to proper and effective antibiotic stewardship globally. Tools and resources to support this endeavor are available this week on the Society's web site (www.sisna.org).

In this issue of *Surgical Infections*, Dr. Massimo Sartelli and over 230 experts from 83 different countries provide a global declaration on appropriate use of antimicrobial agents in hospitals worldwide. Within this declaration, the authors succinctly highlight the contribution of antibiotic exposure, misuse, and overuse to antibiotic resistance and outline the fundamental principles of appropriate antibiotic prophylaxis and therapy in surgery. The Surgical Infection Society endorses this document that has been translated into several languages and made available online with the article as open access for all to view (see online supplementary material at www.liebertpub.com/sur).

Global action is needed urgently to slow the trend of increasing antibiotic resistance. Proper education of healthcare providers and the general public is needed in addition to the adoption of broader multi-disciplinary stewardship programs to achieve appropriate antimicrobial use. Although antibiotic agents are used for numerous indications beyond those that are surgical, surgeons should not abdicate their responsibility to ensure proper antibiotic use and appropriate stewardship for their patients. Surgeons are best positioned to ensure that their patients receive timely and appropriate antibiotic therapy at the correct dosage with the shortest indicated course

and narrowest spectrum [3]. While inter-disciplinary teams can enhance the performance of stewardship programs [4–8], inter-disciplinary involvement should not diffuse the surgeon's responsibility for the patient's outcome.

Performance issues remain common on both sides of the antibiotic prescribing equation; inadequate spectrum, delayed initiation, and insufficient dosing regimens on one side and excessive length of prophylaxis and therapeutic courses, inappropriately broad therapy, and antibiotic use when not indicated on the other. Surgeons must understand the impact of poor antibiotic practices in their patients, both in terms of an inadequate response to therapy for an existing infection and an increased risk of subsequent infectious complications, particularly antibiotic resistant infections.

The surgical community has been slow to respond [3,9,10]. On a daily basis, poor compliance on both sides of the antibiotic prescribing equation is common, although frequently unrecognized and undocumented. Restricting the use of these drugs to specialists who are not involved primarily in the patient's care is a drastic solution that will likely have unintended consequences and can be avoided by education and the adoption of appropriate stewardship. That the Joint Commission on Accreditation of Health Care Organizations is now involved actively, mandating demonstration of education of antimicrobial stewardship by hospitals during their accreditation visits, should not be a surprise.

Through the 2017 U.S. Antibiotic Awareness Week (formerly the "Get Smart About Antibiotics Week"), the CDC is raising awareness of antibiotic resistance as a serious public health concern that requires action [2]. In their global declaration in this issue, Sartelli et al. have highlighted the extent and implications of antimicrobial resistance, a problem that is compounded by a lack of effective drugs coming down the pipeline. This combination has required that old drugs with suboptimal safety profiles are now administered in combination to fight resistant organisms. The authors also highlight the multi-disciplinary approach that is likely required to maximize stewardship performance and summarize the basic

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principles for both antibiotic prophylaxis and therapy in surgical procedures. Education alone is not sufficient to affect a consistent change in behavior [11]. Dedicated efforts, such as establishment of locally adopted multi-disciplinary, evidence-based protocols and guidelines, unit specific antibiotic sensitivity data, compliance monitoring, etc., are required to maximize performance [4–7,12].

Not specifically highlighted in their declaration but of significant importance in limiting antibiotic exposure are efforts to limit hospital-acquired infections. Prevention of hospital-acquired infections can limit significantly the need for antibiotic therapy [13]. Getting to zero in the prevention of blood stream related catheter infection has been shown to be feasible [14]. While getting to zero in other hospital-acquired infections has proven to be more difficult, infection reduction bundles have significantly decreased the rates of hospital-acquired pneumonias, urinary tract infections, and surgical site infections. As highlighted by Sartelli et al., multiple interventions may contribute to a reduction in surgical site infections. Adoption of these interventions is variable, yet many surgeons continue to extend antibiotic prophylaxis despite ample data demonstrating the lack of efficacy and potential harm of this practice.

Antibiotic therapy is a poor substitute for adequate source control and is not effective for non-infectious conditions that produce inflammatory changes. Post-surgical and acutely injured patients frequently manifest signs of inflammation [15]. The presence or absence of non-specific signs such as leukocytosis and fever, however, are poor discriminators of infection [16,17]. Surgical patients should undergo adequate diagnostic evaluation with gold standard techniques to identify a potential infection source if empiric antibiotics are believed to be indicated. The recent STOP-IT trial demonstrated that, with adequate source control, the persistence of signs of inflammation is not an indication for extending antimicrobial therapy [18]. In this study, four days of therapy for complicated intra-abdominal infection achieved an equivalent outcome as antibiotics given for two days beyond resolution of inflammatory signs and symptoms. If recurrent or persistent infection is present, extending antibiotic therapy appears not to be efficacious, and it delays identification and source control.

As the prevalence of antibiotic resistant pathogens increases, the implications of incomplete source control with minimally invasive drainage techniques and ongoing antibiotic exposure greatly increase. Prolonged antibiotic exposure is among the strongest risk factors for the development of antibiotic resistant infections [19–23]. Shorter courses of antibiotic treatment than historically used in pneumonia and blood stream infections also appear to be equally efficacious. Pneumonias, which used to be managed for 14 or 21 days, are now demonstrated to be managed effectively with eight days of antibiotic agents [19,24]. Blood stream infections may require only five to seven days of therapy [25].

We strongly encourage surgeons and all healthcare providers to read the article by Sartelli et al. and to adopt prospective efforts to improve and advance their antibiotic stewardship. We owe it to our individual patients whose outcomes may be dependent on our doing so. We also owe it to the health of our local and global communities to be good stewards of antimicrobial usage. The stakes are high and the consequences dire if we do not.

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