INFECTIONS IN SURGERY – A KEY BATTLEGROUND TO COMBAT ANTIMICROBIAL RESISTANCE

DR MASSIMO SARTELLI, CONSULTANT SURGEON, DEPARTMENT OF GENERAL AND EMERGENCY SURGERY, MACERATA HOSPITAL , ITALY, AND FOUNDER AND ACTING DIRECTOR, THE GLOBAL ALLIANCE FOR INFECTIONS IN SURGERY

In recent years, there has been a worldwide increase in infections caused by multidrug-resistant organisms (MRDOs). The threat of antimicrobial resistance (AMR) is one of the major challenges associated with the management of surgical infections.

The increasing prevalence of AMR is responsible for a significant increase in morbidity and mortality rates associated with surgical infections, as well as a subsequent increase in overall healthcare costs *(1, 2)*. Although AMR is a natural phenomena that occurs as bacteria evolve, there is a well-established relationship between antimicrobial prescribing practices and the emergence of antimicrobial-resistant pathogens *(3)*.

The problem of AMR is widespread worldwide. Clinicians should be aware of their role and responsibility for maintaining the effectiveness of current and future antimicrobials. Clinicians can fight this battle by:

- enhancing infection prevention and control;
- prescribing and dispensing antimicrobials only when they are truly needed; and
- prescribing and dispensing the right antimicrobial(s) to treat the illness *(3)*.

By optimizing the use of antibiotics, clinicians improve patient outcomes and provide better initial antibiotic administration, minimizing the chances of AMR *(3)*. In surgery, antibiotics are used as prophylaxis or as therapy. The use of antibiotic prophylaxis contributes considerably to the total amount of antibiotics used in hospitals and may be associated with increases in antibiotic resistance and healthcare costs. It has been shown that approximately 15% of all antibiotics in hospitals are prescribed for surgical prophylaxis *(4)*.

Perioperative antimicrobial surgical prophylaxis should be recommended for operative procedures that have a high rate of postoperative wound infection or when foreign material is implanted. However antibiotics alone are unable to prevent surgical site infections and strategies to prevent surgical site infections should always be respected.

Antimicrobial therapy is a key component of daily work for surgeons. Surgeons prescribing antibiotics have two contradictory responsibilities. They should offer optimal therapy for patients under their care and on the other hand they should preserve the efficacy of antibiotics and minimize the rate of emergence of MDROs *(3)*.

In Table 1, suggestions for surgical antibiotic prophylaxis are illustrated *(4)*. In Table 2, suggestions for antibiotic therapy in patients with surgical infections are illustrated *(3)*.

Given the complexity of AMR and associated issues with optimizing treatment of patients with surgical infections, a multidisciplinary approach is paramount, although it is not always possible in real-life clinical practice. The best means of improving antimicrobial prescriptions in general, and in emergency surgical units worldwide, is through collaboration among the various specialties within a healthcare institution. Every hospital worldwide should work within its resources to create effective multidisciplinary teams to combat AMR given its budget and personnel constraints.

In 2016 an international multidisciplinary task force from 79 different countries created an alliance by sharing a document on the rational use of antimicrobials for patients with HAIs. The project has been termed AGORA (Antimicrobials: A Global Alliance for Optimizing their Rational Use in Intra-Abdominal Infections)*(3)*. The position paper aimed to review the consequences of antimicrobial use, the evidence behind the global phenomenon of AMR, and to summarize the general principles of antimicrobial therapy in the modern management of patients with intra-abdominal infections.

This collaboration involved an international multidisciplinary task force, promoted by the World Society of Emergency Surgery (WSES), and endorsed by the Surgical Infection Society (SIS), the American Association for the Surgery of

Table 1: Suggestions for surgical prophylaxis

- Antibiotics alone are unable to prevent surgical site infections. Strategies to prevent surgical site infections should always include attention to:
- infection control strategies;
- surgical techniques;
- hospital and operating room environments;
- instrument sterilization processes;
- perioperative optimization of patient risk factors;
- appropriate management of surgical wounds.
- Antibiotic prophylaxis should be administered for operative procedures that have a high rate of postoperative wound infection, or when foreign materials are implanted.
- Antibiotic prophylaxis should be effective against the pathogens most likely to contaminate the surgical site.
- Broad-spectrum antibiotics should always be avoided.
- Antibiotic prophylaxis should be administered not more than 30 to 60 minutes before surgery giving an appropriate dosage that ensures adequate serum and tissue concentrations during the period of potential contamination.
- A single dose is generally sufficient. Additional antibiotic doses should be administered intraoperatively for prolonged procedures.

Table 2: : Suggestions for antibiotic therapy

- Antibiotics should be used after a treatable surgical infection has been recognized or if there is a high degree of suspicion of an infection.
- The source of infection should be always investigated and controlled as soon as possible.
- Empiric antimicrobial therapy should be started in patients with surgical infection because microbiological data (culture and susceptibility results) can require up to 48 –72 hours before they are available for a targeted therapy.
- Knowledge of local patterns of resistance should be always an essential component in the choice of the empiric antimicrobial regimen.
- For patients with community-acquired infections, empiric agents with a narrower spectrum of activity should be administered.
- For patients with hospital-acquired infections, antibiotic regimens with broader spectrum of activity should be administered.
- Targeted antibiotic therapy regimens should be adapted when antimicrobial susceptibility test results are available.
- Antibiotic therapy should be shortened in patients having no signs of on-going infection.
- Patients having clinical features of sepsis beyond five to seven days of antibiotic treatment should undergo diagnostic investigation to determine if there is an ongoing infection.

Trauma (AAST), the Panamerican Trauma Society (PTS), the Indian Society for Trauma and Acute Care (ISTAC), the Korean Society of Acute Care Surgery (KSACS), the World Society of Abdominal Compartment Syndrome (WSACS), the South African Society of Clinical Microbiology (SASCM), the Hellenic Society for Chemotherapy, the Italian Society of Anti-Infective Therapy (SITA), The Italian Society of Anesthesiology, Analgesia, Resuscitation and Intensive Therapy (SIAARTI), the Italian Society of Surgery (SIC), the Italian Association of Hospital Surgeons (ACOI), the Italian Society of Emergency Surgery and Trauma (SICUT), the Italian Society of Intensive Care (SITI) and the World Alliance Against Antibiotic Resistance (WAAAR).

Recently, a Global Alliance for Infections in Surgery was founded and more than 140 experts from more than 80 countries worldwide joined the International Advisory Board *(6)*. The Global Alliance for Infections in Surgery aims to include all professionals involved in the battle against infections in surgery.

The mission of the Global Alliance for Infections in Surgery is to educate healthcare providers in promoting the standards of care in managing infections in surgery worldwide. Since physicians are primarily responsible for the decision to use antibiotics, educating the attitudes and providing the knowledge that underlie their prescribing behaviour is crucial for improving antimicrobial prescription.

The Alliance is convinced that in the fight against AMR a multidisciplinary approach should be mandatory. Epidemiologists and infection control specialists, infectious diseases specialists, microbiologists, hospital pharmacists and pharmacologists, surgeons and intensivists should be all involved; each professional contributing his or her expertise. Only by a cohesive approach may the battle be won against infections in surgery and for the judicious use of antibiotics.

Encouraging multidisciplinary collaboration within the health system to ensure that the prophylactic and therapeutic uses of antimicrobial agents result in optimal patient outcomes should be crucial in the era of AMR. In this setting surgeons should always be aware that making judicious antibiotic prescriptions is an integral part of good behaviour. If surgeons around the world are able to participate in the global fight against antibiotic resistance and demonstrate awareness of the major problem of AMR, they will become pivotal in this fight.

Surgeons are at the forefront of managing patients with infections who often need immediate and adequate antimicrobial therapy, and they are directly responsible for the outcome. It is crucial that surgeons have awareness of the problem of antibiotic resistance and understand that using antibiotics inappropriately may increase the likelihood of treatment failures and AMR. ■

Dr Massimo Sartelli, MD, is consultant surgeon at the Department of General and Emergency Surgery, Macerata Hospital, Italy, Coordinator of Scientific Activities and member of the Hospital Infection Control Committee. He has performed more than 3,000

operations of general and emergency surgery and is the author/co-author of seven manuals of emergency and general surgery, and many publications in international scientific journals. In recent years, his studies have focused especially on surgical infections and sepsis and he coordinated the WSES Guidelines for Management of Intra-abdominal Infections, the WSES Guidelines for Management of Skin and Soft Tissue Infections and the WSES Guidelines for Management of Clostridium difficile Infection in Surgical Patients. He designed and coordinated three multicentre prospective studies (CIAOW Study, CIAO Study and WISS Study) involving medical institutions worldwide defining epidemiological and management profiles of intra-abdominal infections worldwide. He is founder and acting director of the Global Alliance for Infections in Surgery (www.infectionsinsurgery.org).

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