

## Surgical Infections & Rule of Antibiotics

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Data regarding risk factors for surgical procedure and usage of antibiotics are essential to prevent and treat Surgical Site Infections (SSI) [1]. Prophylactic use of antibiotics has been found helpful in reduction of such morbidities. It is a well accepted intervention in numerous surgical procedures as well. However, there are controversies with the fact that the medical fraternity administers antibiotics haphazardly. Evidence based guidelines, and boundaries between prophylactic and therapeutic antibiotic administration are often ignored or disregarded. Literature reveals inappropriate antibiotic prophylaxis during early 1970s in majority of hospitalized patients [2,3]. In this context, indication for prophylaxis, and selection and duration of antibiotics were reported to be irrelevant. However, a better understanding and selection of antibiotic prophylaxis gradually developed. Researcher established general principles that addressed adverse effects of prolonged chemoprophylaxis. These principles lead surgeons with a notion that antibiotics are not a substitute for suboptimal outcome [4].

Rate of inappropriate antibiotic administration in elective colorectal surgery was reported to be 73% in nationwide Malaysian survey. The survey also identified area of gap in published national guidelines for antibiotic administration [5]. Although antibiotic prophylaxis is considered important in surgical procedures [6], inappropriate use of antibiotics is however being practiced in 25-50% of general elective surgeries [7-9]. Meanwhile, beside the fact that appendectomy does accompany 1-5% of SSI with it [1,10,11], efficacy of antibiotic prophylaxis in patients undergoing appendectomy has been observed in several randomized and observational studies [12-17]. Findings from these studies suggest that appropriate use of antibiotics may reduce the risk of SSI following appendectomy by 40-60%. Moreover, prophylactic use of antibiotics shortens the hospital stay as well. It is further elaborated that prevention of wound infection is associated with faster return to normal activity after discharge from hospital [18-20].

Preoperative use of antibiotics and surgical technologies are highly valuable aspects of care in major surgical procedures. However, it is emphasized that preventive measures for SSI are more or less unrealistic. This notion is because of certain unchangeable risk factors such as comorbid diseases, prolong hospital stay and type of surgery [18-21]. Hence, a patient should be provided with abolition of all preventable infections by adopting evidence based actions. The Center for Disease Control (CDC) recommends prophylactic use of antibiotic for either surgical incision or wounds [18]. If the antibacterial regimen does not sufficiently cover all microorganisms, supplementary prophylaxis regimen should be considered e.g. provided the risk of methicillin resistant *Staphylococcus aureus* (MRSA) is highly susceptible and the prescribed regimen does not cover MRSA, vancomycin may be recommended.

Variation in the practice of surgical antibiotic prophylaxis is quite evident in Malaysia. Lim and colleagues conducted a study in seven hospitals of Malaysia and found that different antibiotic regimens were used for among various surgical procedures. Majority (70%) of antibiotics were prescribed to patients where such prophylaxis was probably not necessary. Moreover, when prescribed, antibiotics

were given for durations that were longer than necessary. Lim and colleagues emphasized implementation of guidelines so as to improve the practices of health care professionals. They further highlighted standardization of surgical prophylactic regimens in context of cost reduction and emergence of antibiotic resistance [22]. Meanwhile, a survey conducted among the Ministry of Health Oral Surgery units showed a wide variation in the choice of antibiotics used for surgical prophylaxis. Extensive use of metronidazole and broad spectrum antibiotics (Ampicillin, Amoxicillin, 2<sup>nd</sup> and 3<sup>rd</sup> generation Cephalosporins etc) was profoundly observed in it [23]. Another survey carried among Dental Officers in Pahang and Malacca states of Malaysia revealed that a significant number of Dental Officers did not understand the meaning of antibiotic prophylaxis. Respondents of the survey were further found to be unaware with the drug and regimen usage [23]. Apart from abovementioned issues, Mazza reported the economic burden of common antibiotics that were prescribed prophylactically for infection in Malaysia. Analysis was made on the basis of cost of selected antibiotic and their therapeutic group which was further compared on surgical procedure [21,24]. They found that long acting antibiotics affected the cost to therapy.

The ideal duration of post-operative antibiotics is not clearly defined although most studies report that there is no additional benefit when antibiotic prophylaxis was continued beyond 24 hours [1,15,25-26]. In context of hospital costs related with surgical complications, Dimick and colleagues established that the increased cost was \$1398 per patient for infectious complications; \$7789 per patient for cardiovascular complications; \$52,466 per patient for respiratory complications; and \$1810 per patient for thromboembolic complications [27]. However, it seems inappropriate to evaluate antimicrobial use based on cost alone. Inappropriate usage should also bear over- and under-usage of an antibiotic, burden of mortality rate, the resources consumed for development of new chemotherapeutic agents against resistant microorganism [28]. Hence, the exact cost of prophylaxis therapy should be viewed in consideration with above mentioned outcomes.

On the other hand additional length of stay and charges, and increase in mortality rate due to patient safety events in the hospital can be attributed to postoperative complications [29]. Recent analysis of data from the Veterans Health Administration (VA) National Surgical Quality Improvement Project (NSQIP) confirmed that occurrence of any complication within 30 days of postoperative duration reduced median patient survival by 69% [30]. Such immense reduction in survival

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Received February 15, 2013; Accepted April 16, 2013; Published April 20, 2013

Citation: Khan AH (2013) Surgical Infections & Rule of Antibiotics. Trop Med Surg 1: 116. doi:10.4172/2329-9088.1000116

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was additionally independent of preoperative patient risk. Therefore, it should be clarified that one cannot determine actual economical impact simply by direct cost analysis methods. Professionals working on health economic policy need to design special research projects that should include outcomes, and direct and indirect costs procedures to evaluate inappropriate antibiotic usage in hospitals.

The inappropriate preoperative use of antibiotics also consumes a significant portion of hospital pharmacy's expenses for antibiotics. Healthcare professionals are needed to be encouraged to reduce antibiotics usage for prophylaxis in unfortunate settings. This objective could be achieved either by educational programs or by guidelines implementation.

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