Antibiotic Utilization for Surgical Prophylaxis in a Tertiary Care Teaching Rural Hospital

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ABSTRACT
Rational antibiotic prophylaxis reduces the incidence of surgical wound infection. Improper antibiotic prophylaxis leads to excessive surgical wound infection and increased drug resistance. There is an urgent need to establish and implement antibiotic policy but it cannot be done if baseline data is not available. In this study, the authors gathered baseline data about the pattern of surgical antibiotic prophylaxis in their institute. They found that most of the perioperative use of antibiotics was not as per standard guidelines in terms of choice of antibiotics and total duration of treatment. Interventions are warranted to promote the development, dissemination, and adoption of evidence-based guidelines for antibiotic surgical prophylaxis.

Keywords: Antibiotic Policy, Evidence-Based Guidelines, Preoperative Antibiotics, Postoperative Antibiotics, Surgical Antibiotic Prophylaxis

INTRODUCTION
The discovery of antibiotics is a remarkable achievement of the twentieth century. Prior to the antibiotic era, patients who contracted common infectious diseases had significant morbidity and mortality. The discovery of penicillin in 1927, followed by subsequent discovery of other antibiotics, contributed to a significant decline in infectious disease mortality (Oliphand & Madaras-Kelly, 2008). Antibiotics are effective for the control as well as cure of serious infections. Antibiotic prophylaxis should be used where efficacy has been demonstrated and benefits outweigh the risk. Antibiotic prophylaxis is divided into surgical prophylaxis and nonsurgical prophylaxis (Lampiris & Maddix, 2009).

Surgical antibiotic prophylaxis is defined as the use of antibiotics to prevent surgical site infections (Tripathi, 1999). Surgical procedures can be categorized into four classes (Table 1) with an increasing incidence of bacterial contamination and subsequent incidence of postoperative infection (Culver et al., 1991). Rationally used antibiotic prophylaxis reduces the incidence of surgical wound infection. Prophylaxis is uniformly recommended for all

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Table 1. Classification of surgical procedures (adapted from Culver et al., 1991)

<table>
<thead>
<tr>
<th>Class</th>
<th>Definition</th>
<th>Antibiotics</th>
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<tbody>
<tr>
<td>Class I (Clean)</td>
<td>Operations in which no inflammation is encountered and the respiratory, alimentary or genitourinary tracts are not entered. There is no break in aseptic operating theatre technique (herniorrhaphy, mastectomy, cosmetic surgery, insertion of prosthesis or artificial device).</td>
<td>Not indicated unless high-risk procedure *</td>
</tr>
<tr>
<td>Class II (Clean/Contaminated)</td>
<td>Operations in which the respiratory, alimentary or genitourinary tracts are entered but without significant spillage (laryngectomy, uncomplicated appendectomy, cholecystectomy, transurethral resection of prostate gland).</td>
<td>Prophylactic antibiotics indicated</td>
</tr>
<tr>
<td>Class III (Contaminated)</td>
<td>Operations where acute inflammation (without pus) is encountered, or where there is visible contamination of the wound. Examples include gross spillage from a hollow viscus during the operation or compound/open injuries operated on within four hours (large bowel resection, biliary or genito-urinary tract surgery with infected bile or urine).</td>
<td>Prophylactic antibiotics indicated</td>
</tr>
<tr>
<td>Class IV (Dirty)</td>
<td>Operations in the presence of pus, where there is a previously perforated hollow viscus, or compound/open injuries more than four hours old.</td>
<td>Therapeutic antibiotics required</td>
</tr>
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</table>

* High-risk procedures include implantation of prosthetic materials and other procedures where surgical site infection is associated with high morbidity.

clean-contaminated, contaminated and dirty procedures. It is optional for the clean procedures, although it may be indicated for certain patients and clean procedures that fulfill specific risk criteria (Henry, 2006). Irrational antibiotic prophylaxis leads to excessive surgical wound infection and increase of drug resistance. Common errors in antibiotic prophylaxis include selection of the wrong antibiotic, administering the first dose too early or too late, failure to repeat doses during lengthy procedures, prolonged duration of postoperative prophylaxis, and injudicious use of broad spectrum antibiotics (Lampiris & Maddix, 2009).

Many patients undergo operative procedures in our institute but, there is no baseline data available about the pattern of use of antibiotics in these patients. Therefore, this study was planned to gather baseline data so that corrective measures can be suggested for rational use of antibiotics.

**METHODOLOGY**

This was a prospective observational study, undertaken from February to October 2010, in Shree Krishna Hospital and Medical Research Centre, a 550 bedded tertiary care rural based, teaching hospital attached to Pramukh Swami Medical College, Karamsad, Gujarat, India. The study was approved by Institutional Human Research Ethics Committee. Fifty postoperative patients from all the departments who perform surgeries as therapeutic intervention, i.e., departments of Surgery, Obstetrics & Gynecology, Orthopedics and ENT, thus total of 200 patients were included in this study. Department of Ophthalmology offers day care surgery and use of only topical antibiotics, therefore it was not included in the study. Department of Ophthalmology offers day care surgery and use of only topical antibiotics, therefore it was not included in the study.

**Inclusion criteria:** Patients of all ages and either gender who were admitted and had undergone surgical procedure in the Departments of Surgery, Obstetrics & Gynecology, Orthopedics or ENT.

**Exclusion criteria:** Patients unable to communicate, patients on ventilators, seriously ill patients requiring admission in Intensive Care Unit (ICU).

Prospective participants were explained about the purpose and nature of the study in the language understood by them and writ-
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