THE USE OF SURGICAL ANTIBIOTIC PROPHYLAXIS IN SEVEN MALAYSIAN HOSPITALS

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Abstract. A survey on the use of antibiotics in surgical prophylaxis was carried out in seven Malaysian hospitals. Details of antibiotic prescriptions were obtained through questionnaires completed by the prescriber. A total of 430 such prescriptions was analysed. A large number of different antibiotic regimens were used for a variety of surgical procedures. The majority of prescriptions (70%) were issued for procedures where such prophylaxis was probably not necessary. Antibiotics were also often prescribed for durations that were longer than necessary. There is an urgent need to educate surgeons and standardize surgical prophylactic regimens in order to reduce cost and combat the emergence of antibiotic resistance.

INTRODUCTION

Post-operative wound infection is a major complication of surgery. A nationwide survey in the United States estimated that up to 25% of all nosocomial infections were post-operative in origin (Haley *et al,* 1985). It has been shown that under certain defined conditions, the use of perioperative surgical prophylaxis can significantly lower the incidence of such infections. Nevertheless if used inappropriately such prophylactic antibiotics can produce many negative effects. Some of these undesirable consequences affect the patient. Patients are exposed unnecessarily to the adverse effects of antibiotics if they are used in situations where their benefit has not been established. The use of broad spectrum antibiotics can also lead to a lowering of the colonization resistance of the patients resulting in overgrowth of certain species of the resident flora *eg Clostridium difficile.* Lowering colonization resistance increases the susceptibility of the patient to colonization by antibiotic-resistant hospital strains of bacteria. Another important undesirable effect of antibiotic overuse is the emergence of bacterial resistance to the antibiotics used. Unnecessary use of prophylactic antibiotics can also increase the cost of health care.

The main objectives of this study were to establish the pattern of use of surgical prophylactic antibiotics in Malaysia, identify deficiencies and recommend remedial measures to improve such antibiotic usage.

MATERIALS AND METHODS

A survey of antibiotic usage was undertaken in the surgical and obstetrics and gynecological units of seven Malaysian general hospitals of the Ministry of Health during the period December 1990 to January 1991. The survey was conducted through the use of questionnaires that were designed to obtain information pertaining to (a) the patient's identification data, (b) the nature of illness and type of surgical procedure undertaken, (c) the intention of the doctor in prescribing the antibiotic *ie* for therapeutic or prophylactic purposes and (d) the types of antibiotics used, the dose, routes of administration and the intended duration of use.

The doctor who made the prescription was requested to complete the questionnaire within 24 hours of making the prescription. The units involved in the survey were requested to collect data on all consecutive antibiotic prescriptions starting from a designated date until a set target number was achieved. Surgical units were requested to collect information on 100 prescriptions each while the obstetric and gynecologi-cal units were given a target of 50 prescriptions each. All completed question naires were checked by the first author and if found

to be incomplete, an attempt was made to obtain the missing information through examination of the patient's case records. All data collected were stored in and analysed using a person computer and the Paradox 3.0 (Borland International) software program.

RESULTS

A total of 430 prescriptions for surgical prophylaxis was available for analysis. They comprised 195 prescriptions from the surgical units, 137 from the orthopedic units and 98 from the obstetric and gynecological units. A total of 59 different antibiotic regimens involving 17 different antibiotics were used in 44 surgical procedures.

Table 1 shows the types of surgical procedures where antibiotic prophylaxis were given. Simple toilet and suture was the most common surgical procedure.

Table 2 shows the various types of antibiotics used. Of the 430 prescriptions, 186 (43.3%) were prescriptions of a single antibiotic while the rest were combinations of antibiotics. Ampicillin was the most commonly used antibiotic and was prescribed a total of 275 times (91 prescriptions as a single agent and 184 prescriptions in combination with other antibiotic). A combination of ampicillin and cloxacillin was the most commonly used regimen in toilet and suture and was prescribed in nearly 60% of these procedures. In appendectomies, laparotomies and gynecological operations, a combination regimen involving a beta lactam antibiotic and/or an aminoglycoside together with metronidazole was the most common form of antibiotic prophylaxis.

Fig 1 shows the intended durations of the antibiotic prescriptions. In 156 (36.3%) prescriptions the intended duration of the prescription was not stated. Of the 274 remaining prescriptions where the intended duration was stated, 40% were for an intended duration of seven days. There were only 21 prescriptions where the intended duration was for one day. The mean intended duration for surgical prophylactic prescriptions was 5.5 days. Antibiotics were administered by the oral route in 137 (31.8%) prescriptions; by intramuscular injection in 4 (0.9%) prescriptions and by the intravenous route in the rest (67.3%).

Table 1

Common types of surgical procedures where antibiotic prophylaxis was given.

Surgical procedure	No. of prescriptions
Toilet and suture	74
Appendectomy	32
Laparotomy	31
Open reduction of factures	30
Other orthopedic procedures	29
Dilatation and curettage	26
Hysterectomy	25
Other gynecological procedures	40
Simple excision of tumors	11
Other gastrointestinal operations	9
Skin grafts	8
Herniorrhaphy	8
Biliary tract operations	7
Cesarean sections	5
Prostatectomy	4
Other miscellaneous procedures	91
Total	430

Table 2

Antibiotics used in surgical prophylaxis.

Antibiotic	No. of prescriptions		
	Used singly	Used in combination	Total (%)
Ampicillin	91	184	275 (64%)
Cloxacillin	21	148	169 (39%)
Metronidazole	4	87	91 (21%)
Gentamicin	5	60	65 (15%)
Cefoperazone	25	15	40 (9%)
Other cephalosporins	16	17	33 (8%)
Other aminoglycosides	5	12	17 (4%)
Other antibiotics	19	17	36 (8%)

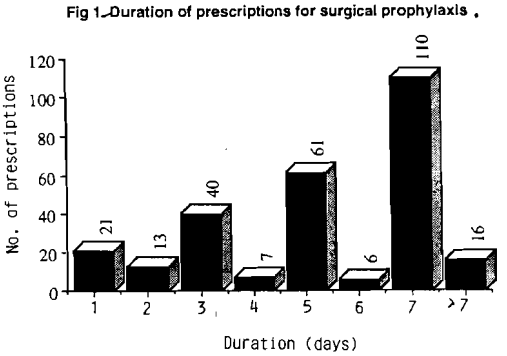

Fig 1–duration of prescriptions for surgical prophylaxis.

DISCUSSION

Perioperative antibiotic prophylaxis is now routinely employed in clinical practice. When employed under certain defined circumstances in an appropriate manner, the value of such prophylaxis is undeniable (Wenzel, 1992). However if used in circumstances where its value has not been clearly established, clearly undesirable effects can result both in terms of cost of health care and the emergence of resistant organisms.

In this survey it was shown that antibiotic prophylaxis has been used in a variety of surgical procedures. Of the 430 prescriptions only 128 (29.7%) were for procedures where antibiotic prophylaxis has generally been agreed to be useful (Kaiser, 1986). Although prophylaxis has recently been advocated for clean procedures not involving insertion of prostheses like breast surgery and heniorrhaphy (Platt *et al,* 1990) such recommendations have yet to be universally accepted. In this survey it was shown that antibiotic prophylaxis was most commonly used in toilet and suture procedures even though it has been shown that such prophylaxis is not required (Sacks, 1988). As such a considerable quantity of antibiotics would have been unnecessarily prescribed.

The choice of antibiotics in this survey was generally found to be appropriate. Cloxacillin and ampicillin were usually chosen when the target for prophylaxis was skin organisms. In abdominal and gynecological surgery, combination regimens of a beta lactam, aminoglycoside and metronidazole were commonly employed. Nevertheless the great diversity of antibiotic regimens used showed a lack of standardization between departments and hospitals. It has been shown that introduction of specific protocols (as opposed to each surgeon choosing his own individual regimen) could result in reduction of both cost and infection rates (Shapiro, 1982).

The timing and duration of administration of antibiotic are crucial in antibiotic prophylaxis. It has been shown that prophylactic antibiotics are most effective when given during the two hour period before surgical incision (Classen *et al,* 1992). The duration of such prophylactic antibiotic should normally not be prolonged beyond the first postoperative day (Kaiser, 1986). In this survey there were only 21

(4.9%) prescriptions that were of a day's duration. Even more disturbing was the finding that nearly 36% of prophylactic prescriptions did not specify the duration of administration thus leading to the possibility of prolonged and unnecessary antibiotic usage. In a significant number of prescriptions, the antibiotics were administered by the oral route although it is generally accepted that the oral route is not sufficiently reliable to allow for effective prophylaxis.

There was therefore an urgent need to educate doctors as well as to standardize the practice of surgical antibiotic prophylaxis in Ministry of Health hospitals. A series of meetings and workshops involving senior surgeons of the country were conducted and an attempt was made to achieve consensus on the types of procedures that warrant prophylaxis and the choice of antibiotics to be used as well as the optimum dosage regimens. These recommendations were published and copies were distributed to all doctors working in Ministry of Health hospitals. Lectures on the rational use of antibiotics and antibiotic policies were also organized in the larger general hospitals of the country. Nevertheless audits of antibiotic usage will have to be conducted in order to ascertain the effectiveness of these measures.

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REFERENCES

Haley RW, Culver DH, White JW, *et al.* The nationwide nosocomial infection rate : A new need for vital statistics. *Am J Epidemiol* 1985; 121 : 159-67.

Classen DC, Evans RS, Pestonik SL, Horn SD, Menlove RL, Burke JP. The timing of prophylactic administration of antibiotics and the risk of surgical wound infection. *N Engl J Med* 1992; 326 : 281-6.

Kaiser AB. Antimicrobial prophylaxis in surgery. *N Engl J Med* 1986; 315 : 1129-38.

Platt R, Zaleznik DF, Hopkins CC, *et al.* Perioperative antibiotic prophylaxis for herniorrhaphy and breast surgery. *N Eng J Med* 1990; 322 : 153-60.

Sacks T. Prophylactic antibiotics in traumatic wounds. *J Hospital Infect* 1988; 11 (Suppl A) : 251-8.

Shapiro M. Perioperative prophylactic use of antibiotics in surgery : principles and practice. *Infect Control* 1982; 3 : 38-40.

Wenzel RP. Perioperative antibiotic prophylaxis. *N Engl J Med* 1992; 326 : 337-8.