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Original Research Article

A retrospective study of antimicrobial usage in wound healing

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ABSTRACT

Background: Chronic wounds are responsible for increase in burden to healthcare systems. The evidence concerning effectiveness of antibiotic therapy or optimal regimens is insufficient. Patients with chronic wounds receive significantly more systemic and topical antibiotics. Current guidelines for antibiotic prescribing for such wounds are often based on expert opinion rather than scientific fact. As there is increasing prevalence of antibiotic resistance, the relationships between antibiotic resistance and rationales for antibiotic therapy have to be determined. Current practice of antibiotic usage for chronic wounds and postoperative wounds in a tertiary care setting should be studied.

Methods: Retrospective study was conducted from February 2017 to February 2018 using medical records of patients with wound admitted in surgical departments in HIMS, Hassan, Karnataka. The inpatient records were analysed, which includes duration of stay in the hospital, number of drugs/products per person, percentage of antibiotics prescribed, percentage of antibiotic injection prescribed, and other modalities used to treat wounds.

Results: In present study, amongst 100 antimicrobial prescriptions, 26 females and 74 males. The most commonly prescribed parenteral antibiotic was ceftriaxone (58%), followed by metronidazole (56%). The average number of antibiotics per prescription was 2.8. The mean duration parenteral antibiotics given was 4.26 days during their hospital stay oral antibiotics were 5.18 days after the discharge from the hospital.

Conclusions: The information generated shall be used to decide the policies to govern the prescription of antibiotics in the management of chronic wounds and post-operative wounds.

Keywords: Drug utilization study, Prescription auditing, Wound healing

INTRODUCTION

Chronic wounds and postoperative wound are responsible for increase in burden to healthcare systems. All chronic wounds harbour microorganisms, however, there is a lack of evidence regarding antibiotic therapy efficacy, optimal regimens or clinical indications for treatment. Systemic and topical antibiotics are often used in the treatment of chronic wounds, despite the lack of evidence. Current antibiotic prescribing guidelines for management of wounds are based on expert opinion and may cause

difficult for the practitioner to interpret and implement them. As a consequence, indiscriminate use of antibiotics is a widespread problem in healthcare that contributes to unnecessary expenditure, increased risks of adverse effects without much benefit, and the development of antimicrobial resistance, that has a significant impact on patient's morbidity and mortality.¹ Antibiotics are one of the mainstay of modern medical care and play an important role in both prophylaxis and treatment of infectious diseases. The matter of their selection, availability, and proper use is of critical importance.

Nevertheless, misuse of antibiotics is a major health issue worldwide.² A study that reviewed prescriptions of antibiotics showed increased additional days of hospitalization arising from abuse of antibiotics.³ Antibiotic misuse behaviour includes inappropriate use for diagnosis, such as prescribing antibiotics for viral infections, or starting therapy with a broad-spectrum agent without appropriate justification.² A study found that antibiotics are used in 36.6-40% of prescriptions in outpatient clinics.⁴ Another study found that 85% of the antibiotics used in humans are prescribed in the outpatient setting.⁵ The most of the antibiotics prescribed to adults are broad-spectrum agents, most commonly fluoroquinolones and macrolides.⁶

The antibiotic chosen should only cover the possible pathogens and should be administered at right dose, correct time and duration. Depending on the nature of the disease and the causative organism, the duration of therapy varies. To ensure the effectiveness and minimize the risk of resistance and dose-related toxicity among patients, the appropriate dosage should be administered. Single agents preferred unless it has been proven that combination therapy is necessary to ensure efficacy or reduce the selection of clinically significant resistance.

While the prevalence of antibiotic resistance is widely recognized, the relationship between antibiotic resistance and rationales for antibiotic therapy yet to be determined.

The current practice of antibiotic use in a tertiary care background should be investigated for chronic wounds and postoperative wounds. The implications of antibiotic usage with regard to antibiotic resistance are also should be studied.

The objectives were to study the usage of antibiotics in the treatment of chronic wounds and to study the antibiotic resistance in chronic wounds at a tertiary centre.

METHODS

Retrospective study was conducted over a period of one year from February 2017 to February 2018 using Medical records of Patients admitted under Department of Surgery, Orthopaedic and OBG in Hassan Institute of Medical Sciences, Hassan with chronic ulcers and those with post-surgical wound. After obtaining Institutional Review Board and Institutional Ethical Committee approval, records of those prescriptions were extracted from the medical record department. Case records of newly diagnosed with chronic wounds or having postoperative wounds, either sex patients were included. The following case records were excluded: Those who came for follow up, patients with multiple wounds. And prescriptions Those containing only topical antimicrobials or only systemic antifungals, antituberculosis, antiprotozoals other than metronidazole, anthelmintics or antiviral drugs. It was decided to draw

a random sample of 100 prescriptions from all the wards by taking lottery.

All records included were analysed for the type of antibiotic, route, diagnosis, average duration of stay in the hospital, percentage of antibiotics prescribed, percentage of antibiotic injection prescribed, and the various other modalities used to treat wounds. Antibiotics were classified depending on their chemical classes such as: penicillins, cephalosporins, carbapenems, monobactams, fluoroquinolones, macrolides, tetracyclines, sulfa compounds, and metronidazole.

Statistical analysis

The data was entered in MS Excel. Descriptive Statistics were applied to infer the findings. All the documented data were evaluated by applying various Statistical Analysis like mean, percentage, standard deviation. This data was analysed by using Microsoft Excel. The results were presented as mean and categorical data were presented as percentages.

RESULTS

In present study, amongst the total of 100 antimicrobial prescriptions were analysed, 26 were females and 74 were males.

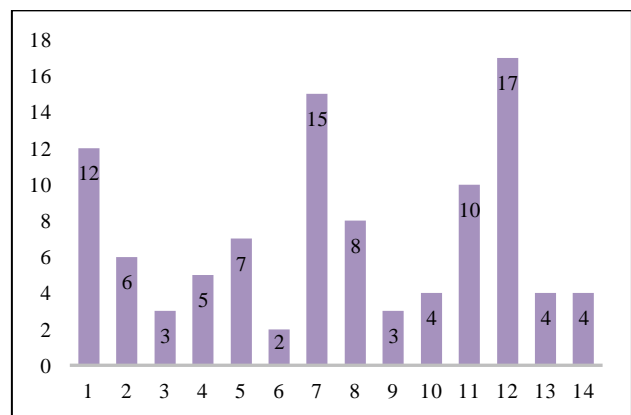


Figure 1: Types of wounds.

Contaminated wounds: 1- diabetic ulcer; 2- ulcer; 3- venous ulcer; 4- road traffic accidents; 5- chronic non healing ulcer; 6- Fournier gangrene. **Clean surgical wounds:** 7- laparotomy; 8- lower segment cesarean section; 9- hysterectomy; 10- below knee amputation; 11- excision; 12- hernioplasty; 13- appendectomy; 14- cholecystectomy.

Out of total number of patients analysed, most commonly encountered contaminated wounds were diabetic ulcer (12%), followed by chronic non healing ulcer (7%), road traffic accidents (5%), venous ulcer (3%), Fournier gangrene (2%) and other types of ulcer (6%). Among clean surgical wounds hernioplasty (17%), laparotomy (15%), excision (10%), lower segment caesarean section (8%), below knee amputation (4%), appendectomy (4%), cholecystectomy (4%), and hysterectomy (3%).

The most commonly prescribed parenteral antibiotic in the surgery wards during the study period was ceftriaxone (58%), followed by metronidazole (56%) and piperacillin (20%). Cefadroxil (65%) amoxiclav (6%) metronidazole (5%) were most common oral preparations that were prescribed.

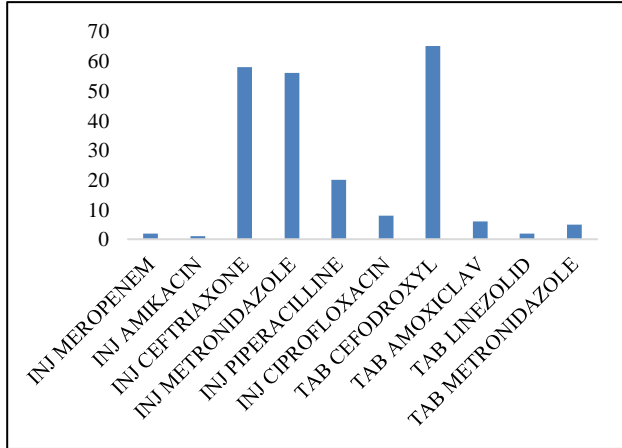


Figure 2: Antibiotics used.

The average number of antibiotics per prescription was found to be 2.8. The mean duration of days the parenteral antibiotics given to the patient was found to be 4.26 days during their stay in the hospital and the mean duration of days the oral antibiotics given to the patient were 5.18 days after the discharge from the hospital. A critical period for successful prophylaxis lies in the 4 hours following implantation of organism into wound for which one or two doses of anti-microbial drugs parentally may be sufficient. 3 six parenteral antibiotics were used in different combinations. Single antibiotic was prescribed to 3 patients, two antibiotics were given to 24 patients, three for 55 patients and four antibiotics were prescribed for 18 patients per prescription.

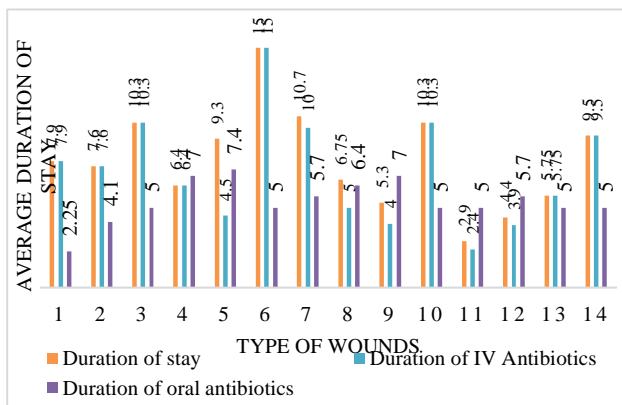


Figure 3: Duration of hospital stay.

Contaminated wounds: 1- diabetic ulcer; 2- ulcer; 3- venous ulcer; 4- road traffic accidents; 5- chronic non healing ulcer; 6- Fournier gangrene. **Clean surgical wounds:** 7- laparotomy; 8- lower segment cesarean section; 9- hysterectomy; 10- below knee amputation; 11- excision; 12- hernioplasty; 13- appendectomy; 14- cholecystectomy.

The average duration of stay in the hospital was found to be 7.49 days. The average duration of stay for Fournier gangrene was 15 days, laparotomy was 10.7 days, venous ulcer was 10.3, below knee amputation was 10.3 days, cholecystectomy 9.5 days, chronic non healing ulcer was 9.3 days, diabetic ulcer was 7.9 days, ulcer was 7.6 days, lower segment caesarean section was 6.75 days, road traffic accidents was 6.4 days, appendectomy was 5.7 days, hysterectomy was 5.3 days, hernioplasty 4.4 days, and for excision wound was 2.9 days.

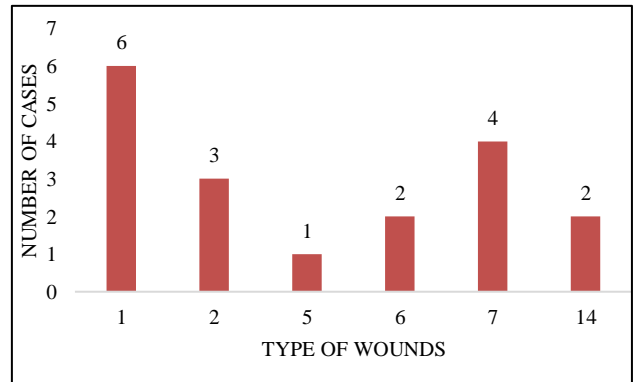


Figure 4: Change of antibiotics.

Contaminated wounds: 1- diabetic ulcer; 2- ulcer; 5- chronic non healing ulcer; 6- Fournier gangrene. **Clean surgical wounds:** 7- laparotomy; 14- cholecystectomy.

Among the 100 patients 18 of them required change in antibiotics due to inadequate response to empirical treatment. 6 cases of diabetic ulcer, 4 cases of laparotomy, 3 cases of ulcers, 2 cases of Fournier gangrene and cholecystectomy, and 1 case of chronic non healing ulcer were probably not responding to empirical treatment.

DISCUSSION

Chronic wounds and postoperative wound are responsible for increase in burden to healthcare systems. Antibiotics are frequently used for the management of chronic wounds and these patients receive significantly more systemic and topical antibiotic prescriptions.

Present study was conducted to analyze the current practice of antibiotic usage for chronic wounds, postoperative wounds and the implications of antibiotic usage with regard to antibiotic resistance in a tertiary care centre in the Department of OBG, surgery, and orthopaedics. The most commonly found contaminated wound was diabetic foot, clean surgical wound is laparotomy.

The study provided an assessment of antimicrobial prescriptions dispensed in the Department of Surgery, Orthopedic and OBG in Hassan Institute of Medical Sciences, Hassan.

The findings of the present study, in this respect, was correlated with another study which showed that most

commonly prescribed class of anti-microbial agent was cephalosporins and cefixime is most common drug used from the third generation cephalosporins. The second most common anti-microbial agent was metronidazole.⁷

The present study revealed the percentage of antibiotic prescription as 2.8%, which is considerably less than what was reported in Sudan (63%), Iran (61.9%), England (60.7%) and Norway (48%).^{8,9} According to the WHO, prescription of antibiotics on 15-25% of encounters is acceptable in the countries where an infectious disease is prevalent.¹⁰ Almost 80% of the antibiotic prescriptions were not associated with any documentation of an indication for antibiotics. Some reports indicate that while the worldwide use of antibiotics is falling, the use of wide-spectrum ones is dramatically increasing. In the current study, it was noticed that the large group of prescriptions belonged to those third generation cephalosporins and metronidazole mainly because these categories covered both aerobic and anaerobic organisms.

Abuse of antibiotics increases the risk of resistance, results in treatment failure which may eventually lead to more morbidity and mortality, and increased health care costs.¹¹ It is thus not surprising that up to one-third of the community-acquired pathogens are highly resistant to fluoroquinolones.¹² Increased incidences of resistance to various antibiotics has been reported in various studies in many limited resource countries including India. The lack of routine drug sensitivity tests and surveillance in many countries means that antibiotics and other antimicrobial drugs are not rationally used.^{13,14} even in this study revealed that only 10 (10%) of the sampled prescriptions had an associated culture result among 48 of the cultures were requested. Although at some situations the empirical use of antibiotics may be essential but culture and sensitivity will avoid failure of treatment and prevents drug resistance. Even though the adequate diagnostic facilities are lacking, the Regular audits of diagnostic and prescribing practices will help to determine and control prescribing behavior. Hence, we can prevent failure of treatment and emergence of drug resistance.

Limitations

There are few limitations in present study. This study data was collected from MRD records. Besides that, the lack of complete data in patients' files and inconsistency of the terminology used in documentation in the MRD might have hindered analysis. Therefore, we cannot comment objectively on appropriateness. And, the study was conducted in a single hospital and therefore, cannot be considered a representative study of entire city.

CONCLUSION

The overall percentage of antibiotic prescriptions in the Department of OBG, surgery, and orthopaedics seems to be within the acceptable range as per the WHO standards.

Some antibiotics may still be prescribed without a clearly documented indication, e.g., for viral infections or inflammations reported to be of non-infectious aetiology. In addition, it appears that some broad-spectrum antibiotics such as ceftriaxone, co-amoxiclav are overprescribed. The reason behind this is not understood, and requires further study for clarification. It is also important to study the cost impact of antibiotic misuse, and focus on individual departments. Furthermore, it is recommended that this type of study be extended to other centres as well as private centres. An effective intervention program is needed to start and foster an antibiotic stewardship to promote a more rational drug use by physicians.

The information generated shall be used to decide the policies to govern the prescription of antibiotics in the management of chronic wounds and post-operative wounds. This will also guide an antibiotic stewardship program in hospitals, necessary to optimize the use of antimicrobial prescribing to improve patient care, decrease the cost of antimicrobial medications in hospitals and reduce the spread of antimicrobial resistance. Moreover, antimicrobial stewardship programs will ensure continued efficacy of available antimicrobials.

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Conflict of interest: None declared

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