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Antimicrobial prescribing patterns at a rural hospital in Trinidad: evidence for intervention measures

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Summary

The antibiotic prescribing patterns on 527 case notes of discharged patients over a two-month period at a teaching hospital in southern Trinidad were retrospectively analyzed. Forty four percent of patients had received one or more antibiotics. The greatest exposure rate was on the orthopedic (79.4%), pediatric (70.8%), and obstetric/gynecology (64%) services. Genital tract infections, urinary tract infections, skin/soft tissue infections and lower respiratory tract infections were the commonest indications for antibiotic prescription. The antibiotics most frequently prescribed were ampicillin (53.4%), chloramphenicol (16.5%) and gentamicin (11.3%). Ninety-six (41.0%) patients were described as being allergic to penicillin, and of these, 5 received ampicillin and 3 received cefaclor. Poor communication and lack of confidence in laboratory technician expertise were identified as possible co-factors partly responsible for most inappropriate antibiotic use in the hospital. The study also revealed that prevailing prescribing patterns at the SFGH might be improved through refresher training of doctors in clinical microbiology and the identification of clinical areas for which targeted antibiotic intervention may be warranted.

Keywords: *antibiotic, Trinidad, infections prescription.*

Résumé

Les modes de prescription des antibiotiques des 527 cas de patients des centres hospitaliers universitaires au sud de Trinidad pendant une période de deux mois ont été analysés rétrospectivement. 44% des patients avaient reçu un ou plusieurs antibiotiques. Le taux d'utilisation le plus élevé était donc les services de pédiatrie (79.4%) et d'obstétrique/gynécologie (64%). Les prescriptions d'antibiotiques étaient plus indiquées pour les infections de l'appareil génital, urinaire, de la peau et des tissus mous et de l'appareil respiratoire. Les antibiotiques les plus prescrits étaient l'ampicilline (53.4%), les chloramphénicol (16.5%) et la gentamicine (11.3%). 96 (41.0%) patients étaient allergiques au pénicilline et 5 ont refusé l'ampicilline et 3 les leflore. Le manque de confiance et la communication médiocre de l'expertise des techniciens de laboratoire ont été identifiés comme un facteur co-responsable de la plupart des utilisations inappropriées d'antibiotiques dans l'hôpital. L'étude montre qu'il est possible d'améliorer la plupart des modes de prescription par une formation de perfectionnement des médecins en microbiologie appliquée et de l'identification des domaines cliniques pour lesquels les antibiotiques ciblés pourraient être justifiés.

Introduction

The largest proportion of pharmaceutical consumption in developing countries are antimicrobial agents [1,2], and sev-

eral developed nations have concluded that most hospitals prescribing for antimicrobial agents was often irrational [3-5]. Although many infectious diseases of bacterial origin constitute a major cause of morbidity and mortality, most of these illnesses can be prevented through improved personal hygiene, environmental sanitation and vaccination. Still, many diseases have to be treated with antimicrobial agents, especially on hospitalized patients.

Several reports have shown that antimicrobial agents are prescribed for more than 50% of patients admitted to hospitals [6-9], and the drugs were prescribed either without any proof of infection or treatment was inappropriate in terms of drug choice, dosage, route of administration or duration of therapy. The uncontrolled/inappropriate use of antimicrobials will undoubtedly have important economic and medical impact on health care. Several major consequences of uncontrolled/inappropriate use of antimicrobials include emergence of resistant organisms, lengthy hospitalizations and nosocomial infections which tend to make treatment of patients more costly, more risky and less rewarding [1,10]. The proper use of antimicrobial agents is therefore of major concern worldwide, but any effort to improve the national prescribing of these drugs should consider factors such as aggressive drug promotional activities of pharmaceutical companies, a lack of objective information on antimicrobials, high cost, increasing microbial resistance, patient demand and compliance, and a great number of new drugs and prescriber competence.

In Trinidad and Tobago, studies on drug utilization are very scarce. Occasional surveys conducted at Accident and Emergency dispensaries with the intention of evaluating overall patterns of drug use indicate that antimicrobials are the most prescribed group of drugs. However, little is known about antimicrobial prescribing patterns/use in hospitalized patients at our institution.

This study was undertaken to assess the patterns of antimicrobial use in a large rural hospital in southern Trinidad.

Patients and methods

The survey was carried out at the San Fernando General Hospital (SFGH). The SFGH is a 1000-bed tertiary care teaching hospital in southern Trinidad, with an average daily census of 800, and a monthly admission rate of approximately 1800 patients. The hospital serves the southern areas of the country, which have a population of about 410,000. Trinidad is 4824 square kilometers in area and is the larger of a twin-island Republic (Trinidad and Tobago), located about 11 kilometers off the northern coast of Venezuela in South America. The total population of the Republic is about 1.25 million people.

A total of 527 case notes of daily discharged patients were reviewed over a 2-month period, November 1, 1997 to December 31, 1997. There were 209 patients from general medicine, 125 from obstetrics and gynecology, 97 from orthopedics, 24 from general surgery, and 72 from

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pediatrics. Information extracted from the notes were patients age, sex, admission and final diagnoses, length of hospitalization, type and number of antimicrobials used (dose, route of administration, duration of treatment) and recorded using a standard form. Data analyses were done using Epi Info software version 6.

Total antimicrobial agents used were calculated for each service and the drugs were ranked according to frequency of use. Antimicrobials were defined in conformity with classification in the World Health Organization (WHO) List of Essential Drugs [11]. Any change in drugs, route of administration, dose, use of poly-antimicrobial agents was determined for each service (wards).

Results

A total of 527 case notes were reviewed and analyzed during the study period. Two hundred and thirty-four (44.4%) were those of patients who had one or more antimicrobial drugs (Table 1). The greatest exposure rate was on the ortho-

mented microbiology laboratory (culture report) evidence of infection. Many culture reports were later found in a well-stocked pile in the ward clerk's desk, presumably to be put into the patient notes at sometime. Apparently, no one bothered to check the laboratory for a duplicate report.

The indications for which antibiotics were prescribed are presented in Table 2. Genital tract infections, pelvic inflammatory disease, vaginitis, gonorrhoea and urinary tract infections were the most common, accounting for 57% of all infections treated. On the obstetric/gynecology services genital tract infections accounted for 75% (60 of 80) of treated cases. Several patients on the orthopedic service, for which antibiotics were prophylactically prescribed, had amputations due to diabetic complications (eg. gangrene of toe, foot).

Although a wide array of antibiotics was available in the hospital pharmacy, the ones most frequently prescribed at the time of the study are shown in Table 3. Ampicillin and gentamicin were the most commonly prescribed agents on all services. Chloramphenicol was used most frequently on the

Table 1: Antimicrobial exposure in the study group at the SFGH* according to service.

Service	No. of patients	Number (percent) patients exposed to					>Four	Total Exposure
		None	One	Two	Three			
Gen. Medicine ¹	209	187 (89.5)	13 (6.2)	8 (3.8)		1 (0.50)	22 (10.5)	
Obstet/Gynae ²	125	45 (36.0)	39 (31.2)	33 (26.4)	8 (6.4)	0	80 (64.0)	
Orthopedics	97	21 (21.6)	44 (45.3)	25 (25.8)	6 (6.2)	2 (2.1)	77 (79.4)	
Pediatrics	72	19 (26.3)	19 (26.3)	29 (40.3)	3 (4.2)	0	51 (70.8)	
Gen. Surgery ³	24	20 (83.3)	3 (12.5)	1 (4.2)	0	0	4 (16.7)	
Total	527	292 (55.4)	118 (22.4)	96 (18.2)	18 (3.4)	2 (0.4)	234 (44.4)	

¹General Medicine; ²Obstetrics and Gynecology; ³General Surgery; *San Fernando General Hospital

Table 2: Infections by site and service for which antimicrobials were prescribed.

Site	SERVICE					Total
	Gen. Med. ¹	Gen. Surg. ²	Orthopedic	Obstet/ Gynae ³	Pediatrics	
Upper respiratory tract	2	0	3	0	4	9
Lower respiratory tract	11	1	11	0	3	26
Urinary tract	5	3	28	20	2	58
CNSa	0	0	0	0	7	7
GITb	1	0	8	0	3	12
Skin/self tissue	2	0	21	0	5	28
Genital tract	0	0	0	60	0	60
Septicemia	1	0	5	0	0	6
Eye discharge	0	0	1	0	0	1
Total	22	4	77	80	24	207

¹General Medicine; ²General Surgery; ³Obstetrics and Gynecology; ^aCentral Nervous System; ^bGastro-intestinal tract.

pedic, pediatric, and obstetric/gynecology services where 79.4% (77 of 97), 70.8% (51 of 72) and 64% (80 of 125) had received antibiotics, respectively. The least exposure was in general medicine, 10.5% (22 of 209) and general surgery, 16.7% (4 of 24). Table 1 also shows the extent of multiple antibiotic usage. A combination of drugs was prescribed in 116 (41.0%) of those suspected of having an infectious episode. Almost all patients received one or more antibiotics without docu-

pediatric services along with ampicillin. Many admissions requiring this combination were children with diagnosis of acute bacterial meningitis. Other instances were occasional cases of protracted wound infections, sepsis and intra-abdominal infections. The overall use of cloxacillin was surprisingly low especially on the orthopedic service where it was shown in a previous report that most staphylococcal isolates were sensitive to this drug at the SFGH [12].

Table 3: Antimicrobial agents used at the SFGH, frequency (percentage) of totally prescribed drug per service

Antimicrobial	SERVICE					Total
	Pediatrics	Obstet//Gyne ¹	Gen. Med. ²	Orthopedics	Gen. Surg ³	
Ampicillin	30	81	20	25	10	166
Augmentin ^a	0	7	0	1	0	8
Cefaclor	2	8	0	0	0	10
Chloramphenicol	27	8	0	0	0	51
Doxycycline	0	0	0	3	0	3
Erythromycin	0	1	1	2	0	4
Metronidazole	0	8	3	0	6	17
Gentamicin	4	16	7	4	4	35
Co-trimoxazole ^b	0	0	8	0	0	8
Others ^c	1	2	0	5	0	8
Total	64	121	29	50	20	310

¹Obstetrics and Gynecology; ²General Medicine; ³General Surgery; ^aAugmentin = amoxicillin-clavulanate; ^bCo-trimoxazole = sulfamethoxazole-trimethoprim; ^cOthers = cloxacillin, clindamicin

The duration of antibacterial therapy varied considerably according to service. For the surgical and orthopedic services, therapy averaged 10 to 35 days, for the pediatric service 3 to 21 days, and the medical service, 5 to 10 days, but longer in cases of infective endocarditis. No adverse reactions to the antibiotics were recorded. However, of the 96 patients described in their notes as being allergic to penicillin, 5 received ampicillin and 3 received cefaclor. There was no documentation of adverse reactions to ampicillin in the patients' notes.

Discussion

Although more than 44% of admissions to the SFGH were found to have been exposed to one or more antibiotics, there were differences in the utilization of these drugs among the different services. The obstetric/gynecology, orthopedic and pediatric services utilized almost 90% of all prescribed drugs while the other 10% was utilized among the general medical services. Exposure rates have been reported to be lower in most hospitals in the developed world [9,15], and when compared to hospitals of the developing world, rates as high as 80% have been recorded [11,13,16].

Most surveys have also found that antimicrobial prescribing was better on medical wards than on surgical/orthopedic and gynecology wards, and our results agree with this trend [3,15-17]. One reason identified in this study was that most admissions to the medical services were for non-infectious reasons such as uncontrolled hypertension, cerebrovascular accidents, diabetes, cancers and renal failure. Therapeutic use of antibiotics based on the retrieved culture reports was highest on the medical services and was more often rational than on the orthopedic, pediatric and obstetric/gynecology services. Factors influencing the prescribing of antibiotics at the SFGH may therefore have included attitudes of the staff on various services to antibiotic therapy, prevalence and susceptibility to antibiotics of pathogens isolated in the hospital, prevalence of nosocomial infections on a particular service and aggressive promotional efforts of the pharmaceutical industry. Studies on prescription patterns of antibiotics from other hospitals [1,8,13,14], have shown variable results, but most seemed related to the aforementioned factors.

In our series most prescriptions were used empirically, based on the clinical impression of the admitting clinicians. Because almost all patients' notes did not have documented laboratory confirmation of infection, it was assumed that the culture report appeared to have no effect on prescription decision. This could be due to a lack of confidence in the laboratory technicians' expertise as a qualified medical microbiologist was not on staff for several years (one was recently employed by the hospital). Many patients were given 3 or more antibiotics with repeated shifts to other agents without any sound reason, indicating a "trial-and-error" approach to therapy. Correlating culture and sensitivity report with the clinicians' empiric therapy showed that about 40% of prescribed antibiotics agreed with the antibiogram of the pathogen. Therefore, under such conditions the high ratio of exposure (39.3%) to antibiotics as observed in this study may suggest an overuse of these agents on some services, rather than an epidemiological trend in the hospital.

Efforts to promote confidence and proper utilization of the microbiology laboratory services by clinicians have been the task of the newly employed medical microbiologist. This effort can contribute to a more rational approach to the selection of antibiotics. It was also felt that the use of the microbiology laboratory services would have an educative value [18], as a good knowledge of medical microbiology among general practitioners has been correlated with low prescription rates [19]. Whether our study will have any sustained positive effect on future prescribing patterns at the SFGH is difficult to predict, but the signs are promising with the addition of the new medical microbiologist to the staff. Since his employment a system of restrictive reporting of antibiotic susceptibilities have been instituted along with frequent communications between the clinicians and the microbiologist and the latter's involvement in patient care. Also, confidence in the laboratory technicians' expertise is growing.

Our study also showed that hospital surveys are useful in quickly identifying aspects of antibiotics therapy that could be more rational and areas where communication needed to be strengthened in order to improve the overall care of patients.

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