Antibiotic-Prescribing Practices of Primary Care Prescribers for Acute Diarrhea in New Delhi, India

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ABSTRACT

Objective: To obtain information on the current prescribing rates of antibiotics in acute diarrhea in the community. Methods: Antibiotic use in acute diarrhea in the community (December 2007–November 2008) was surveyed by using patients’ exit interviews at public and private facilities from four residential localities. Data were collected from 10 public sector facilities and 20 private clinics over 1 year. The percentage of patients receiving antibiotics and the prescribing pattern of antibiotics were analyzed by using the anatomical therapeutic chemical classification and the defined daily dose. Results: At public facilities, 43% (71 of 168) and at private facilities 69% (76 of 110) of the patients with acute diarrhea were prescribed at least one antibiotic. Diarrhea increased during peak humid summer months, but doctors were fairly consistent in their antibiotic prescribing throughout the year. The main antibiotic class that was prescribed in both public and private sector facilities was fluoroquinolones, J01MA (91.5% and 96%, respectively). Pediatricians working in the private sector prescribed antibiotics to 51.5% (17 of 33) of children with diarrhea, whereas pediatricians working in the public sector prescribed antibiotics to 23% of children with acute diarrhea. At public facilities, the most commonly prescribed fluoroquinolone was norfloxacin, followed by ofloxacin and ciprofloxacin. At private clinics, it was ofloxacin followed by ciprofloxacin. Conclusions: This study clearly showed the irrational use of antibiotics for the treatment of acute diarrhea in children and adults that warrants intervention strategies.

Keywords: acute diarrhea, antibiotics, community, primary care, treatment guidelines.

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Introduction

The rapid emergence of antimicrobial resistance (AMR) in the community has become a major global health problem. It is estimated that 20% to 50% of all antibiotic use is inappropriate, resulting in an increased risk of side effects, higher costs, and higher rates of AMR in community pathogens [1–3]. An important inappropriate use of antibiotics is for viral or self-limiting infections. Here, we report the irrational use of antibiotics in acute diarrhea in the community. Viral pathogens such as rotavirus account for 70% to 80% of all diarrheal episodes [4]. In the majority of episodes of acute residential diarrhea, the cause usually remains unknown because of the self-limiting nature of the disease and the difficulty and delay in identifying the pathogen, and so the routine use of antimicrobials is not recommended [5]. The joint statement by the World Health Organization (WHO) and the United Nations International Children’s Emergency Fund in 2004 recommended the use of low osmolarity oral rehydration solution (ORS) along with zinc for the treatment of acute diarrhea in children [6,7]. The Indian Academy of Paediatrics published guidelines for the management of acute diarrhea in 2004 [8], which were further revised in 2006 [9]. The guidelines focused on the use of low osmolarity ORS and zinc. Antibiotic use is recommended only for acute bloody diarrhea/dysentery. As per local standard treatment guidelines also, antibiotics are not recommended for acute diarrhea in adults [10]. Unfortunately, diarrhea is a condition for which the misuse of antibiotics is common and is reported from different parts of the world [11–13]. Understanding the extent and pattern of antimicrobial use for acute diarrhea in the community is important for defining a regional intervention program to promote the rational use of antimicrobials and thus limit the spread of AMR and reduce the cost of therapy for acute diarrhea. Hence, this study was conducted in Delhi, India, to obtain information on the current prescribing rates of antibiotics in acute diarrhea in primary care settings in the community. In the absence of community-based databases on antibiotics use in developing countries, a methodology recently established for surveillance of antibiotic use at New Delhi by conducting “Exit Interviews” of the patients [14–16] was used. This study was conducted from December 2007 to November 2008. The primary aims of this study were 1) to find out the percentage of antibiotic prescriptions in acute diarrhea by primary health-care providers in public and private sectors and 2) to determine the pattern of antibiotic choice for diarrhoea in public and private sectors.

Conflicts of interest: The authors have indicated that they have no conflicts of interest with regard to the content of this article.

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Methods

This study was part of a larger study on surveillance of antibiotic use and resistance in the community, and data were collected from four residential localities (municipal wards) of New Delhi, India. The four areas were Rajinder Nagar, Patel Nagar, Karol Bagh, and Rajouri Garden.

Facility selection

To get a complete picture of antibiotic use in the community for acute diarrhea, both public and private sector facilities were surveyed.

1. Public sector: Eight dispensaries (primary health-care facility) and two hospitals (secondary care level) under the Government of National Capital Territory of Delhi were in the surveillance area of the study, and all the facilities were enrolled for the study.

Private clinics: 20 private sector general practitioners and specialists willing to cooperate for the study and practicing in the chosen areas—4 pediatricians, 3 physicians, and 13 general practitioners.

Data collection methodology: patients’ exit interviews

Data on antibiotic use were collected by trained data collectors (pharmacists) who conducted exit interviews with patients leaving the facility [14]. The study was conducted at five private practitioners per month in the chosen areas. Five practitioners were randomly chosen every month from a pool of 20 practitioners enrolled for the study. All patients who were visiting the clinic after they came out from the prescriber’s office were asked whether they had diarrhea for the last 1 to 2 days and if no blood in the stool. Any patient with symptom of only acute diarrhea without blood in the stool was enrolled for the exit interview and his or her prescription was monitored.

A predesigned proforma was used to collect data regarding the name, dose, and duration of the antibiotic prescribed.

The total number of patients with symptoms of acute diarrhea at each facility during the time data collectors were in the facility was recorded at each visit. Data collectors’ schedules were randomly prepared for the day and time (1 hour) of visits every month for data collection. Data collectors visited each public facility two times per facility every month and for private clinics three times every month to collect the data.

Outcome measures

The anatomical therapeutic chemical classification and the defined daily dose measurement units were assigned to the data [17]. Antibiotic use was measured in terms of the percentage of patients receiving an antibiotic. The denominator was the total number of diarrhea patients with and without an antibiotic attending the facilities during the time of data collection. Describing patterns for various antibiotics in public and private clinics were analyzed. Consumption of antibiotics was expressed as total number of defined daily doses per 1000 diarrhea patients attending the facilities.

Data management

All the data collected were entered into software developed in Visual Basic, SQL Server, and Crystal Reports. The same software was used to analyze the data.

Ethical approval

Ethical approval for the study was obtained from Vallabhbhai Patel Chest Institute, University of Delhi, India, and also from WHO Ethics Review Committee. Informed consent was obtained from all participants and facilities involved in the study.

Results

Total number of patients and seasonal pattern of acute diarrhea

Patients who had symptoms of only acute diarrhea and visited the enrolled public and private facilities during the study time were monitored. A total of 398 prescriptions from public facilities and a total of 110 prescriptions from private clinics were studied. A very clear seasonal variation in the number of patients with acute diarrhea was observed at both public and private facilities (Fig. 1). The number of diarrhea patients increased during peak summer humid months May, June, and July.

Percentage of antibiotic prescription

At public facilities, 43% of patients with acute diarrhea received at least one antibiotic, whereas at private clinics, overall 69% of the patients received any antibiotic for the treatment of acute diarrhea. Pediatricians of our study at private clinics prescribed antibiotics to 51.5% of children with acute diarrhea. These children were younger than 12 years. Subgroup analysis of public sector for age showed that 23% of children younger than 13 years were prescribed antibiotics for acute diarrhea. No seasonal difference in the percentage of patients receiving antibiotics for diarrhea treatment was noticed.

Pattern of antibiotic prescriptions for acute diarrhea

Doctors at both types of public facilities, that is, dispensaries (primary health-care center) and secondary care level hospitals (30- and 50-bed) prescribed antibiotics in the similar fashion. Of the total prescriptions with antibiotics, 89% and 94% of prescriptions, respectively, had a fluoroquinolone at dispensaries and at secondary care level hospital. At private facilities, of the total antibiotics prescribed, 96% of prescriptions had a fluoroquinolone and for pediatricians it was 100%.

Table 1 shows the members from each group of antibiotics prescribed and expressed as defined daily dose per 1000 patients for acute diarrhea. At public sector facilities, norfloxacin was the most prescribed fluoroquinolone followed by ofloxacin and ciprofloxacin, whereas at private sector facilities, ofloxacin was the main member followed by norfloxacin. At private clinics, a few patients also received a combination of ciprofloxacin or norfloxacin with tinidazole.
Table 1 – Trends in antibiotic use (DDD/1000 patients) for acute diarrhea in the community (December 2007–November 2008).

<table>
<thead>
<tr>
<th>Antibiotic class</th>
<th>Public sector (DDD per 1000 patients)</th>
<th>Private sector (DDD per 1000 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoroquinolones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norfloxacin</td>
<td>21,731</td>
<td>18,708</td>
</tr>
<tr>
<td>Ofloxacin</td>
<td>12,703</td>
<td>36,094</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>8,001</td>
<td>—</td>
</tr>
<tr>
<td>Ciprofloxacin + tinidazole</td>
<td>8,739</td>
<td></td>
</tr>
<tr>
<td>Norfloxacin + tinidazole</td>
<td>6,920</td>
<td></td>
</tr>
<tr>
<td>Tetracycline</td>
<td>2,400</td>
<td>—</td>
</tr>
<tr>
<td>Doxycycline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cephalosporins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>933</td>
<td>4,494</td>
</tr>
<tr>
<td>Cephalaxin</td>
<td>109</td>
<td>—</td>
</tr>
<tr>
<td>Macrolides</td>
<td>130</td>
<td>—</td>
</tr>
<tr>
<td>Roxithromycin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penicillins</td>
<td>47</td>
<td>1,125</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin + clavulanic acid</td>
<td>301</td>
<td></td>
</tr>
<tr>
<td>Cotrimoxazole (901EE)</td>
<td>301</td>
<td></td>
</tr>
<tr>
<td>Nalidixic acid</td>
<td>333</td>
<td>—</td>
</tr>
</tbody>
</table>

DDD, defined daily dose.

Discussion

This survey has provided evidence of the irrational use of antibiotics for acute diarrhea in primary care settings for ambulatory patients in both the public and private sectors. WHO guidelines [6,18] and Indian guidelines [9,10] for the treatment of acute diarrhea clearly mention that antimicrobials should not be used routinely. This is because most episodes of acute diarrhea are caused by viruses, not bacteria. Also, it is not possible to distinguish clinically the episodes of diarrhea caused by enterotoxigenic Escherichia coli from those caused by agents unresponsive to antimicrobials, such as rotavirus or cryptosporidium [18]. In addition, the use of antimicrobials adds to the costs of treatment, risks adverse reactions, and enhances the development of resistant bacteria [19]. The exact amount of cost saved is difficult to analyze from the study, but it is clear that whatever amount was spent on antibiotics by each patient could have been saved if prescribers fully adhered to the guidelines recommended for the treatment of acute diarrhea.

Our study revealed that overall doctors of the public sector were prescribing antibiotics to less number of patients compared with doctors of private clinics (43% vs. 69%) and the percentage of children receiving antibiotics for acute diarrhea at public sector facilities (23%) was less than that of children receiving antibiotics at private clinics (51%). The poorer prescribing in the private sector has been demonstrated widely in developing countries [20]. A recent cross-sectional study conducted in India [21] showed that 6 prescriptions out of 843 adhered to the recommended treatment of ORS along with zinc for the treatment of acute diarrhea in children and antibiotics were prescribed to 71%. There are many studies conducted in other countries mainly for children that have shown frequent prescription of antibiotics for the treatment of acute diarrhea. A study from Bangladesh [22] showed that only 27% of children received treatment for acute watery diarrhea according to WHO guidelines and the rest either got antibiotics or other treatments not recommended by WHO guidelines. A study conducted in Peru [23] revealed that the physicians’ prescribing practices of antimicrobials seemed to be more related to agreement with social expectations rather than their knowledge and guidelines. A cross-sectional survey conducted in Thailand also showed an overuse of antibiotics in the treatment of acute diarrhea [24].

A qualitative study conducted with prescribers of both public and private sector facilities of the same municipal wards of Delhi where this study was conducted [25] revealed that an important reason for private practitioners to prescribe antibiotics is a financial consideration. The various other reasons doctors put forth for prescribing antibiotics for diarrhea are as follows: diagnostic uncertainty, whether diarrhea is bacterial or viral, perceived patient expectation for antibiotic prescription; need to satisfy the patient by giving something more than just ORS; and in the case of public sector facilities, insufficient time due to overcrowding to explain to patients that antibiotics are not needed.

A surveillance of antibiotic resistance rates done in these same municipal wards of Delhi of E. coli in the urine of pregnant women showed more than 70% resistance to nalidixic acid and more than 50% resistance to norfloxacin [15,26]. Surveillance of antibiotic use in these areas has shown a very high use of fluoroquinolones [14,16], and the present study also indicates overuse of fluoroquinolones in acute diarrhea. These results indicate that irrational use of fluoroquinolones in these communities is resulting in resistant urinary tract infections.

The greatest strength of this study is that it clearly shows that it is possible to collect useful data for antibiotic use in both public and private sector facilities, at the individual patient level in resource-constrained settings where a database is not available. This is one of the few studies conducted in India that have shown the prescribing pattern of antibiotics for the treatment of acute diarrhea in both public and private sectors and for both adults and children. The study has some inherent weaknesses. First, it was conducted in four residential localities of one urban area, and so generalization should be done with caution for the rest of Delhi and cannot be done for other areas of India. Second, the presence of data collectors may have changed the prescribing habits of doctors at private clinics. Doctors may have prescribed fewer antibiotics than normal. Some of the Hawthorn effects may have reduced over the period of 1 year, as the doctors got used to the presence of the data collectors. In public facilities, the bias introduced into doctors’ prescribing may have been less as the data collectors were in the pharmacy area and doctors were not always aware which day and time data collectors were visiting.

Conclusions

Results of this study have revealed a very high use of antibiotics by primary care doctors for the treatment of acute diarrhea for ambulatory patients, both for children and for adults. Fluoroquinolones were the main antibiotics that were prescribed by both public sector and private sector doctors. The overuse of antibiotics in the community is one of the major factors responsible for increasing trends of AMR and also increases the cost of treatment. The problem of AMR is particularly pressing in developing countries where the burden of infectious diseases is high, availability of newer antibiotics is poor, and cost constrains the replacement of first-generation antibiotics. Urgent suitable and sustainable interventions are needed for the rational use of antibiotics in the community and adherence to treatment guidelines for acute diarrhea.

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REFERENCES