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RESEARCH ARTICLE

Patterns of drug use in the public sector primary health centers of Bhopal district

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Abstract *Objective* To study drug use in public sector out-patient centers in Bhopal district, Madhya Pradesh Province, India. This study was conducted as part of the provincial health Department's efforts to develop a state drug policy. It was intended to inform policy elements concerned with the promotion of rational drug use. *Method* Health facilities studied included the functioning 9 primary health centers (rural) and 17 civil dispensaries (urban) in the district. World Health Organization core drug use (prescribing, patient care and facility) indicators were used. A total of 1,051 patient prescriptions were analyzed for prescribing indicators. Patient care indicators for 1,034 (of these patients) were measured. To study facility indicators, a list of 20 essential drugs was developed by the research team (as the province did not have its own drug list at the time of the study). The availability of these drugs was studied. *Main outcome measure* Core drug use indicators. *Results* The overall average number of prescribed drugs per patient was 2.76 (higher in rural than in urban centers). Only 1.4% of the 1,051 prescriptions did not have any drugs (non pharmacological management only). Generic drugs included 48.4% of all drugs prescribed. The proportion of consultations with antibiotics and injections prescribed was 63.5% and 13.8%, respectively. The proportion of drugs prescribed from the list we developed was 66.8%. Three quarter of all prescribed drugs were dispensed at the facility. In total, 87.1% of patients knew the dosage schedule of the medication prescribed. *Conclusion* Antibiotic use in our setting was high, while generic drug prescribing was lower in comparison to other recent studies in Asia. The study provides a baseline measure against which changes in practice can be monitored as elements of the state drug policy are put into place.

Keywords Bhopal district · Drug use indicators · India · Public sector · Primary healthcare · WHO study model

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Impact of findings on practice

- There is a need to promote rational drug use in the public sector health centers in the Bhopal district.
- There is room for more generic prescribing in the Indian Bhopal District.

Introduction

India's National Commission on Macroeconomics and health [1] states that drugs are one of the three main cost drivers of the healthcare system (the other two being human resources and medical technology). On the demand side, drugs and medicines form a substantial portion of the out-of-pocket spending on health by households in India. The same report states that, of the total out of pocket expenditure on health, expense on drugs is estimated to be nearly 83% in rural India, and 77% in urban India.

Inappropriate prescribing, a recognized worldwide problem of the healthcare delivery system, results in a wastage of economic resources and non-optimal patient

treatments. In the last two decades, the World Health Organization (WHO) has promoted rational drug prescribing. The WHO specifies Drug Use Indicators for adoption in drug utilisation studies [2] in order to assess problems of clinical or economically inappropriate drug use, to make comparisons between groups or to measure changes over time. It is also used as a supervisory tool in health facilities and to measure the effect of an intervention.

This drug utilization study in Bhopal district, Central India, was conducted in the public sector at a time when the provincial health department in Madhya Pradesh (MP) province (capital city, Bhopal) was engaged in the process of developing a provincial drug policy. The department of health was supported in this endeavor by the Danida (Danish International Development Assistance) assisted MP Basic Health Service Program. The study was intended to inform elements of the policy related to rational drug use. The aim of the study was to assess prescribing, patient care and facility indicators (as developed by the WHO) [2], in the context of public sector primary health care in Bhopal district.

Methods

Study setting

This study was done in Bhopal district, MP in October 2004. Bhopal district (1.8 million population) hosts the capital city of the MP province (60.4 million population) [3]. It is strategically located in the middle of India which makes it an important link between north–south and east–west rail and road routes criss-crossing the country. Majority (80%) of the population in the district is urban while 36.5% is below poverty line [4].

All public sector primary health centers (9) and civil dispensaries (17) in the district participated in the study. Primary health centers and civil dispensaries are the lowest tier of the public health system in rural and urban areas of the district respectively, where a doctor and ancillary staff are available. In this district, they were out patient facilities.

Data collection

The study was designed using methods recommended by the WHO to investigate drug use in facilities [2]. The study was organized in collaboration with the Department of Community Medicine, at the medical university in Bhopal. Teams of three research assistants each, were organized, so that each team covered one health facility. Research assistants were medical students at the local medical universities. An initial training program for all the research assistants was organized at the Department of Community Medicine, where the study objectives, procedures and instruments were explained. This was followed by a pre test at four similar health centers in an adjoining district.

Medical Officers in each of the study centers were informed in advance from the university about the study, the visiting research students and confidentiality was assured. The average patient numbers at each center per day was ascertained. Each center was visited for three full working days in the week.

Prescribing indicators

These included average number of drugs per encounter, percentage of drugs prescribed by generic name (as per the WHO model list of essential drugs), percentage of encounters with an antibiotic prescribed (antibiotics included all anti-infectives: antifungals, antibacterial, antihelminths and antivirals, including topical preparations of these), percentage of encounters with an injection prescribed (injections excluded immunizations and injectable contraceptives) and percentage of drugs prescribed from an essential drugs list (EDL). As the province did not have an EDL at the time of the study, a list of 20 essential drugs were selected (that were considered essential at a primary out patient facility in this setting). The list was finalized by consensus between members of the project team, and the faculty of public health at the university. In addition, categorization of drugs based on therapeutic group was done.

To study prescriptions, a comprehensive form was developed, (based on the WHO detailed encounter proforma). Between 40 and 50 consecutive prescriptions were collected from each center over the study period at each center. In a few centers with extremely high patient loads, every third prescription was included in the study, so the practices from all centers were equally represented regardless of varying patient loads. Prescriptions were collected during the usual opening hours when routine outpatients visited the center. No emergency prescriptions were collected. Data from these prescriptions were fed into databases and analyzed to obtain prescribing indicators. A total of 1,051 prescriptions were analyzed.

Patient care indicators

These included average consultation time, average dispensing time, percentage of drugs actually dispensed, percentage of drugs adequately labeled (i.e. having patient name, drug name and when the drug should be taken) and patient's knowledge of correct dosage schedule for all drugs. These parameters were recorded for 1,034 of the 1,051 patients.

One research assistant sat outside the examination room and measured consultation time, while another sat with the pharmacist, to measure dispensing time. A third research assistant finally met the patient as s/he exited the health center. After a brief introduction, he noted the number of drugs dispensed and enquired into the patient's knowledge of how to take the drugs prescribed.

Facility indicators

These include the availability of certain key drugs and an essential drug list. At the end of the study in each center, availability of the 20 essential drugs selected was ascertained by physical verification. The availability of EDL was not looked into as this was under preparation in the province at the time of study.

All data was entered into SPSS version 11.5. Prescribing and patient care indicators were analyzed as means and proportions. Analysis was done as prescribed in the WHO core drug use indicators manual [2].

Results

Background socio demographic characteristics of patients

A total of 1,051 patient prescriptions (746 urban and 307 rural) were studied in 9 rural and 17 urban public primary health facilities of Bhopal district. Gender of the patients was not mentioned in 229 (21.7%) prescriptions. Of the remaining where gender was mentioned, 451 (42.7%) were male and 372 (35.3%) were female. The proportion of male and female patients attending centers in rural and urban areas was similar. Age was not mentioned in the 321 (30.4%) of patient prescriptions. Mean age of the other 731 patients was 27.4 years (28.9 in urban, 24.7 in rural, overall range 0.1–100 years).

Nature of presenting symptoms

These were described in 41.1% of prescriptions; the remainder only listed the drug treatment. Fever was the presenting complaint in 115 cases (10.1%), upper respiratory symptoms were seen in another 10.4%, while other symptoms included body ache, trauma and skin conditions (approximately 5% each).

Drugs prescribed

A total of 2,907 drugs were prescribed in 1,051 prescriptions (mean = 2.76, range 0–7). Only 15 prescriptions (1.4%) did not have any drugs (non pharmacological management only).

Table 1 Prescribing and patient care indicators in public primary health facilities in rural and urban Bhopal district, India, 2004

	Total	Rural	Urban
Prescribing indicators			
Average number of drugs per encounter	2.76	3.04	2.65
% of generic drugs	48.4%	60.5%	42.5%
% of encounters with an antibiotic prescribed	63.5%	67.4%	58.1%
% of encounters with an injection prescribed	13.6%	11.1%	14.6%
% drugs from EDL	66.9%	74.5%	63.1%
Patient care indicators			
Mean consultation time (min)	1.96	2.17	1.90
Mean dispensing time (s)	54.3	71.3	47.1
% of drugs actually dispensed	74.9%	82.7%	71.7%
% of drugs adequately labeled	40.9%	45.3%	39.6%
% patients with correct knowledge of dosage	87.1%	85.9%	87.7%

Prescribing and patient care indicators are shown in Table 1.

On the basis of therapeutic class, a quarter (25.1%) of all 2,907 drugs were non steroidal analgesic–antipyretics (22.8% and 26% in rural and urban areas, respectively), 22.7% were antibiotics (similar in both areas), 13.2% were multivitamins (twice as high in rural areas), 11.9% were anti allergic (twice as high in urban areas), and 7.9% were anti-emetics or antacids (similar in both).

Facility indicators

Of the list of 20 essential drugs drawn up for this study, an average of 17.44 were available. The EDL was unavailable at any of the centers as it was not yet prepared.

Discussion

This study was performed using the WHO indicators to investigate current drug utilization practices at the public primary health centers in Bhopal district, India, prior to the implementation of a provincial drug policy. The present findings help identify the existing problems of drug use and set a baseline against which drug use practices in the future can be compared (after implementation of the policy elements).

Our results in comparison with other recent studies

Table 2 presents a comparison of core drug use indicators in our study and other recent studies from Asia and Africa [5–8]. Before comparisons are attempted, it should be

noted that while all studies were performed in the same 2–3 year period, the studies in Laos, Bahrain and Brazil were in similar public health centers. The numbers of facilities in the studies varied and are given in the table. However, the Sudanese study was conducted in the out-patient departments of two tertiary hospitals in Khartoum.

In the present study, the average number of 2.76 prescribed drugs per patient was similar to those seen in other parts of Asia and higher than the 10 country average of 2.2 in the 1993 multi-country study [9]. The percentage of generic drugs in our study was higher than the other sites barring the Lao PDR. Another Indian study on drug utilization among pediatric outpatients in a tertiary hospital in Mumbai [10] reported 74% generic drugs prescribed, showing a wide variation in this indicator from different settings in the country.

The percentage of encounters with an antibiotic prescribed was high in our study, similar to Sudan and lower than in a 1998 study in Sind, Pakistan [11] where 77% of encounters resulted in antibiotic prescription. A recent study from south India [12] reported that patient requests/expectations, patient satisfaction, and fever, strongly pressurized practitioners to prescribe antibiotics. The percentage of encounters with injections was similar to other study settings. An Indian study [13] describes provider perceptions driving injection use in urban India (provider perceptions of patient preference for injections, and an economic incentive in case of private providers).

Consultation time in our study was shorter than in others (possibly related to high patient loads), though dispensing time was similar to the Sudanese and longer than in the Brazilian study. However both consultation and dispensing times have been show to vary considerably, between 1–6.5 min and 13–83 s, respectively in the 12 country study [9]. While only a low percentage of drugs were adequately labeled, a high proportion of patients had the right knowledge of their dosage schedule. This is perhaps because of verbal communication between the dispenser and the patient as many patients visiting these centers may not be able to read.

At the time of the study, the province did not as yet have its EDL. The percentage of drugs prescribed from a list of 20 drugs (66.8%) prepared for the study was relatively high, considering the 'list' contained only 20 drugs. With a more expanded list, it is likely that the proportion would have been higher, closer in line with the other Asian settings in Table 2. A recent study from Delhi [14] has shown over 80% of medicines being from the EDL after the introduction of Delhi Essential drug programme.

Rural urban differences in Bhopal

Rural–urban differences in prescribing were observed in our study (though the sample size precludes making conclusions on significance of this difference). It is possible that rural centers prescribe more drugs as infectious conditions are seen more commonly and drugs for symptomatic relief (antipyretics, analgesics) would be prescribed alongside the antibiotic. In urban centers, in comparison, it is possible that a higher proportion of non-communicable conditions present, accounting for a lower percentage of antibiotics. The lower rate of generic prescriptions in urban centers is possibly because of easy access to branded drugs in city pharmacies, whereas in rural centers, more drugs are dispensed from the facility itself (most of which are generic).

Table 2 Prescribing and patient care indicators from recent studies in Asia and Africa

	Bhopal, India ($N = 26$)	Sudan [5]	Lao PDR [6] ($N = 30$)	Bahrain [7] ($N = 20$)	Brazil [8] ($N = 10$)
Prescribing indicators					
Average number of drugs per encounter	2.76	1.9	3	2.6	2.2
% of generic drugs	48.4%	43.6%	78%	14.3%	30.6%
% of encounters with an antibiotic prescribed	63.5%	65%	47%	26.2%	21.3%
% of encounters with an injection prescribed	13.6%	10.5%	18%	8.3%	8.3%
% drugs from EDL	66.9%[a]	–	84%	99.8%	83.4%
Patient care indicators					
Mean consultation time (min)	1.96	4.5	–	–	9.2
Mean dispensing time (s)	54.3	46.3	–	–	18.4
% of drugs actually dispensed	74.9%	–	97%	–	60.3%
% of drugs adequately labeled	40.9%	37.6%	67%	–	–
% patients with correct knowledge of dosage	87.1%	37.2%	74%	–	70%

[a] Measured against list of 20 essential drugs selected

Methodological issues

This paper describes drug utilization in public primary health centers for the district as a whole. While some observations on the urban-rural differences have been made, this study is underpowered to investigate real differences (The WHO guidelines [2] suggest at least 10 facilities/prescribers in each group when comparisons between these are being studied).

Another limitation is the Hawthorne effect (the effects of awareness of participants that they are the subjects on an experiment's results) as this was not a retrospective study (unlike other prescription audits). The WHO guidelines recommend retrospective data collection (over the past year) preferably (over prospective) for prescribing indicators. However in our setting, the absence of key components in routine records necessitated a prospective study. Thus besides the Hawthorne effect mentioned above, the study could suffer from possible biases imposed by seasonality, current inconsistencies in the drug supply cycle and staffing levels that might have existed during the short period of prospective study at each center.

While consecutive sampling of patients was used to collect prescribing indicators prospectively, in seven of the centers with extremely high patient loads, systematic sampling was used (every third patient). This was done to maintain an equal representation of all health centers in the district (and not have over representation of prescribing practices from busy centers). Also 30 consecutive cases in such centers could be studied over a very short time period (an hour or two) which could introduce a bias. Systematic sampling allowed encounters to be spread over 2–3 full working days at busy centers, reducing this. It also allowed better coordination between the research assistants at these centers.

Drug utilization studies in the private health sector

This study was done in the public health sector in view of the state's attempt to develop a state drug policy applicable to that sector. While the pubic sector does provide outpatient care to many, India is unique in having one of the most highly privatized healthcare delivery systems in the world [15] which is extremely heterogeneous and poorly regulated (In the study province, 75% of all qualified doctors and 72% of all qualified paramedical staff work privately on a fee for service basis [16]). It is crucial that ways are found to regulate drug treatment practices in this large private sector as well. Research to study drug utilization in the private sector needs to be implemented as a starting point.

Conclusion

The current findings highlight the existing prescribing and dispensing practices at the public primary health centers in Bhopal district India. Of particular concern is the high proportion of antibiotic prescriptions and the relatively low number generic drugs prescribed. Besides identifying these, this study also provides a baseline measure against which changes in practice can be monitored as elements of the state drug policy are put into place. Similar drug utilization studies in the private sector need to be performed to provide a more complete picture of drug utilization patterns in this context.

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Conflict of Interest None

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