*Full Length Research Paper*

# Assessment of antibiotic prescribing behavior of consultants of different localities of Pakistan

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**The objective of study was to evaluate the pattern and practice of consultants especially antimicrobials in the allopathic health sector in Pakistan to assess the magnitude of the problem and suggesting corrective measures. A cross-sectional survey in various cities of Pakistan was conducted which was developed in line with WHO and has so far been implemented in 12 developing countries. A total of 4923 prescriptions of 197 consultants were collected and analyzed. Drugs dispensed were 480142; average number of drugs per prescription for all disciplines was 3.13±1.5. The number of encounters with antibiotics in medicine department was 20.17% of the total antibiotic while ophthalmology had no encounter with injectables. Cost of 23.79% of prescriptions was below Rs.100 and 4.9% above 500 rupees. Therapeutic categories of the drugs prescribed were 14.6% antimicrobial followed by 12.5% cardiovascular or renal drugs. The age of the patient, severity of disease, socio-economic status, previous experience of treating similar patients were important factors that determined choice of drugs. EDL was not available in most of the facilities. Around 80% drugs were prescribed by brand name. The drugs prescribed from the essential list were around 30%. Concern of losing patients to others practitioners was considered among the top three factors by only 18% of providers. Age of the patient, severity of disease, socio-economic factors were important factors that determined choice of drugs. Prescribing and dispensing practices are inappropriate and irrational in Pakistan like many developing countries. Managerial and regulatory interventions are proposed to improve the rational use of drugs.**

**Key words:** Prescribing behavior, consultants, antimicrobials, Pakistan.

## INTRODUCTION

The evaluation and assessment of health care quality is receiving worldwide attention (Marry et al., 2006) and drugs play an important role in the health care delivery system, giving it credibility (Odusanya and Bamgbala, 1999). The information on quality of healthcare is being demanded by policy makers, healthcare professionals and the general public (Pont et al., 2004). Standards setting and assessment of the quality of care through performance review should be part of everyday clinical practice (Patterson, 1986). The differences in prescribing behavior, co-morbidity, and limitations of large administrative databases have identified biases that are either unique in pharmacoepidemiological studies or may present themselves more frequently in these studies (Mahyar et al., 2006).

In many countries, a big chunk of the total drug budget is allocated to antimicrobials and they are often the single largest group of medicines purchased in developing countries. Studies have also shown that about one third to half of all hospitalized patients receive an antibiotic, which accounts for more than 30% of hospital budgets in many hospitals (Vlahovic-Palcevski et al., 2005). Increasing drug cost is a burden to many healthcare delivery systems in both developed and developing countries. When physicians have a financial incentive to dispense medications, they are likely to prescribe more

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**Table 1.** Drug prescription and dispensing for all providers.

| Name of department | Total number of drugs | Average no. of drugs/ prescription | Total no. of drugs/prescription |
|---|---|---|---|
| Medicine | 3575 | 4.1 | 14658 |
| Orthopedics | 999 | 1.9 | 1898 |
| Pediatrics | 1680 | 2.6 | 4368 |
| Gynecology and obstetrics | 2196 | 3.8 | 8345 |
| ENT | 1584 | 3.2 | 5069 |
| Dermatology | 1201 | 2.8 | 3363 |
| Psychiatry | 1595 | 4.3 | 6858 |
| Ophthalmology | 884 | 2.2 | 1945 |
| Dental surgery | 955 | 2.4 | 2292 |
| Others (oncology, emergency etc) | 865 | 4.2 | 3633 |
| Total | 15534 | 3.13 | 52429 |

drugs. In previous research, dispensing doctors, in comparison with non-dispensing doctors, were found to prescribe greater numbers of drugs, more antibiotics and injections (Trap and Hansen, 2002b). Ensuring appropriate prescribing is a major challenge for the health services. Variation in the volume and cost of prescribing in different parts of the country, between practices and between individual doctors, has been a concern to many clinicians and policy-makers (Watkins et al., 2003; Hansen et al., 2003). An improvement in antibiotic pres-cribing to reduce bacterial resistance and control hospital costs is a growing priority, but the way to accomplish this is poorly defined. Appropriate drug utilization has a huge contribution to global reductions in morbidity and mortality with its consequent medical, social and economic benefits (Tefarra et al., 2002). The present study was conducted with primary objective to evaluate the pattern and practice of consultants especially antimicrobials in the formal allopathic health sector in Pakistan. The other objective was to assess the magnitude of the situation and suggesting corrective measures for its control.

## METHODS

The survey was cross-sectional and conducted in five cities of Pakistan that is Lahore, Gujranwala, Sheikupura, Sialkot and Kasur in between August 2008 to April, 2009. The survey methodology was adopted which was developed by WHO (WHO/DAP/93.1:1-97) and has so far been implemented in 12 developing countries (Hogerzeil and Bimo, 1993). It is based on the application of selected drug use indicators. The practitioners were informed that data was being collected on the common diseases prevalent in the district and the drugs beings used for the purpose but not about the main objective of the study to minimize changes in prescribing behavior. Survey instruments were developed and pre-tested in another city. A survey instrument's were comprised of question-naires carrying information on prescription practices, scoring on health problems presented to the prescriber, inventory of essential drugs at facility, attributes and characteristics of prescriber. The list of essential drugs was adapted from the WHO recommended list of essential drugs for primary care facilities. Pharmacists and a few

students of the final year of School of Pharmacy, Punjab University, Lahore, were engaged and especially trained in administering survey instruments.

The sampling unit was the patient prescriber encounter (P-P encounter). The sample size was estimated using quality of prescription as the outcome variable. Twenty P-P encounters per consultant were taken to be appropriate. The facilities were visited again in case the number of samples was not adequate. The rationale being that a larger sample of facilities is preferable for analysis of prescriber attributes and characteristics. Data was analyzed on EPIINFO version 5. The study was approved by the Ethics committee of the School of Pharmacy and Board of Studies of Punjab University, Lahore, Pakistan.

## RESULTS

There were 4923 prescriptions from 197 consultants from various parts of Pakistan that is Lahore, Gujranwala, Sheikupura, Sialkot and Kasur. The total numbers of drugs dispensed were 480142 and the average number of drugs per prescription for all disciplines was 3.13±1.5. The total number of drugs for medicines departments was 3575 and average number of drugs prescribed was 4.1±0.6, followed by orthopedic 1.9, Pediatrics, 2.6, Gynecology and Obstetrics, 2.6, ENT, 3.8, Dermatology, 2.8, Psychiatry, 4.3, Ophthalmology, 2.3, Dental Surgery, 2.4 and other 4.4. Department wise categorization is as follows that is 17.71% for medicine, 10.68% for ENT, 13.12 for pediatrics, Orthopedics 11.74%, Dermatology, 8.71%, Psychiatry, 7.53%, Ophthalmology, 8.16%, Dental Surgery, 8.08% and others department 4.18% (Table 1).

The medicine department had maximum number of encounters with antibiotics that is 20.17% of the total antibiotic encounters followed by ENT 19.66%, Pediatric 9.41%, Gynecology and Obstetrics 10.88%, Orthopedics 1.78%, Dermatology 13.44%, Psychiatry 1.26%, Ophthal-mology 6.49%, Dental Surgery 7.63% and others 8.63% (Table 2). No. of encounters with injection were 143, that is, 49 (34.27%) in Medicine, 10 (6.99%), ENT, 8 (5.60%), Pediatrics, 8 (5.60%), Gynecology and Obstetrics, 24

**Table 2.** Encounters with an antibiotic/Injectables prescribed (n=1912/143).

| Name of department | Number | Percentage (%) | Injectables | Percentage (%) |
|---|---|---|---|---|
| Medicine | 396 | 20.17 | 49 | 34.27 |
| ENT | 376 | 19.66 | 10 | 6.99 |
| Pediatrics | 180 | 9.41 | 8 | 5.60 |
| Gynecology and obstetrics | 208 | 10.88 | 24 | 16.79 |
| Orthopedics | 34 | 1.78 | 16 | 11.19 |
| Dermatology | 257 | 13.44 | 0 | 0 |
| Psychiatry | 24 | 1.26 | 20 | 13.99 |
| Ophthalmology | 124 | 6.49 | 0 | 0 |
| Dental surgery | 146 | 7.63 | 12 | 8.40 |
| Others (oncology, emergency etc) | 165 | 8.63 | 4 | 2.80 |

**Table 3.** Characteristics of consultants (n=197) and cost analysis (4923).

| Characteristics consultants | |
|---|---|
| **Qualification** | **No (Percentage)** |
| FCPS | 82 ( 41.61) |
| FRCS | 34 ( 17.26) |
| MRCP | 24 (12.18) |
| MCPS | 15 (7.61) |
| DGO | 8 (4.06) |
| MD | 8 (4.06) |
| Others | 24 (12.22) |
| | |
| Average age of consultants: | 47+9 |
| Average no. of patients seen | 18+7 |
| Average duration of practice | 210 min |
| Average time taken for each patients | 8-10 min |
| | |
| **Cost analysis (n=4923)** | |
| **Cost (Rs)** | **No (Percentage)** |
| 1-100 | 1171 (23.79) |
| 101-200 | 2056 (41.77) |
| 201-300 | 928  (18.85) |
| 301-400 | 445 (9.03) |
| 401-500 | 239 ( 4.85) |
| Above 500 | 84 ( 1.70) |

antimicrobial, 1180 (7.6%) analgesics and anti-inflammatory, 419 (2.7%) antidiabetics, 1942 (12.5%) cardiovascular or renal drugs, 1553 (10%) drugs acting on CNS, 1771 (11.4%) antihistamines, 699 (4.5%) drugs for GIT, 111 vitamins and minerals, 1771 (11.4%) derma-tological or topical agents, 699 (4.5%) respiratory drugs, 326 (2.1%) drugs acting on ANS, 186 (1.2) hormones, 1243 (8%) were drugs acting on CNS and 326 (2.1%) were drugs of various categories and 31 (0.2%) were anti-parasites (Figure 1). The potential factor that influence the prescriptions of the consultants were also studied (Figure 2).

## DISCUSSION

The improper use of drugs coupled with unlimited access is very common in many developing countries (Siddiqui et al., 2002). A total of 4923 prescriptions of 197 consultants were studied. A study conducted in the Attock District in Pakistan assessed this problem in the formal allopathic health sector and compared prescribing practices of health care providers in the public and private sector. The prescribing trends of drugs reflect the clinical judgment of the clinicians. The average number of drugs per pre-scription was found to be 3.13 in our study which is less than that reported from studies conducted in, Ghana (3.6) and Bengal, India (3.2), Attock (4.1), Karachi (Bosu and Ofori-Adjei, 1997; Das et al., 2001; Hazra et al., 2000; Flaherty et al., 2000). Lesser number of drugs is a posi-tive sign as polypharmacy is known to be a contributing factor for hospitalizations (Najmi et al., 1998). EDL was not available in most of the facilities. More than 80% drugs were prescribed by the brand name. It may be an evidence of vigorous promotional strategies by pharma-ceutical companies. The low percentage prescription of drugs by their generic name is responsible for the high cost of drugs to patients. Our value is less than that reported in other studies which were 23.6 and 80% drugs were prescribed from essential drugs list (Enwere et al., 2007).
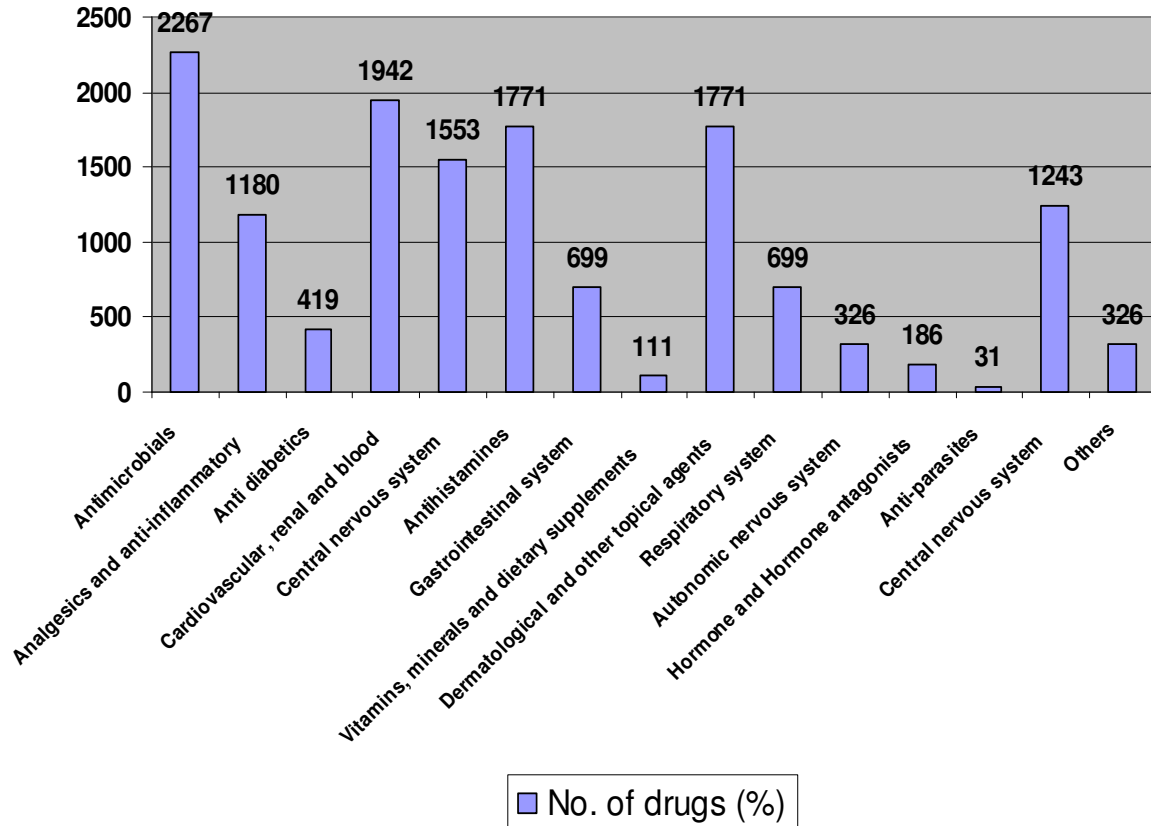
(11.19%, Psychiatry 20 (11.19%), Dental Surgery, 12 (8.40%) while Ophthalmology had no encounter with Injectables (Table 2).

The cost of 1171 (23.79%) of the prescriptions were below Rs.100, followed by 2056 (41.77%) in the range from Rs.101-200, 928 (18.85%) in the range from Rs. 201-300, 445 (9.03%) in the range of Rs.301-400, 239 (4.85%) in the range of Rs.401-500 and 239 (4.85%) were above Rs.500 (Table 3). The therapeutic categories of the drugs prescribed in the various disciplines is explained are as follows that is 2267 (14.6%)

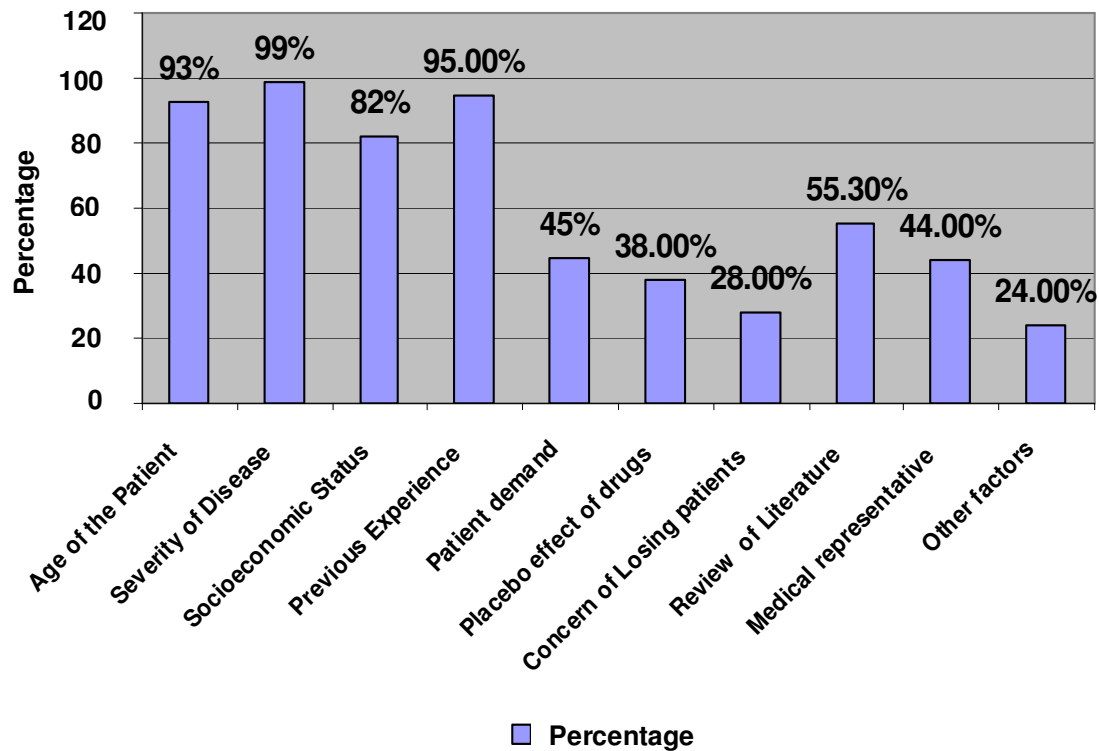**Figure 1.** Therapeutic category of drugs prescribed.



**Figure 2.** Potential factors that influence the prescription of consultants (n=197).

Drug use studies are a necessary tool for assessing prescribing problems in hospitals, recognizing areas for improvement and improving drug prescribing practices in these facilities (Bharity et al., 2008). The prescribing practices of the Madhya Pradesh is more of an irrational types like polypharmacy, overuse of antibiotics and injection, less number in generic names and prescribed from essential drug list. There is an urgent need for some interventions to improve the situation (Rehan and Pal, 2002). The frequency of prescribing antimicrobial was that is 14.6% of all categories of drugs. 17.71% of prescriptions were from the Department of Medicine. Our results contradict the result of studies in Brazil and India (Shankar et al., 2002). A similar study conducted in Western Nepal, two years back had a different pattern of distribution; antimicrobials (26.6%) were prescribed more often (Das et al., 2001). The average cost per prescription was found to be high (US$ 3.26). This shows a rise in prescription cost in the recent past in Western Nepal. Cost is a very important factor in developing countries like Pakistan as it can be a major cause for non-adherence.

The number of encounters with antibiotics was highest in medicine department that is 396 which is 20.17% of the total antibiotic encounters. The ENT had 376 (19.66%), Pediatric, 180 (9.41%), Gynecology and Obstetrics, 208 (10.88%), Orthopedics, 34 (1.78%), Dermatology, 257 (13.44%), Ophthalmology, 124 (6.49%) and others 165 (8.63%). The number of injectables encounters were found to be 143 and maximum were in medicines that is 49 (34.27%) while Ophthalmology had no encounter with Injectables. This is a potential area for intervention for public sector as well as association of physicians in the country. The cost of the prescriptions was higher than the earlier study conducted in Karachi (Jabar et al., 1996). The therapeutic categories of the drugs prescribed in the various disciplines is explained in and is as follows that is 2267 (14.6%) antimicrobial, 1180 (7.6%) analgesics and anti-inflammatory, 419 (2.7%) antidiabetics, 1942 (12.5%) cardiovascular or renal drugs, 1553 (10%) drugs acting on CNS, 1771 (11.4%) antihistamines etc. The potential factors that influence the prescriptions of the consultants were also studied. The patient's knowledge about the use of drugs were also studied in depth that is discipline wise and found that the patients attending Medicines consultants knowledge about drugs was 64.2%, 76.9 for ENT, 65.6% for pediatrics, 46.7% for Gynecology, 81.2%, Dermatology, 80.2%, Psychiatry, 53.7%, Ophthalmology, 88.1%, Dental Surgery, 88.4% while only 32.8% for patients attending emergency and oncology etc. Factors those were considered were patient as well as provider related. All consultants gave consideration to age of the patient, severity of disease, socioeconomic status of the patient and their previous experience of treating similar patients as important factors that determined their choice of drugs. EDL was not available in most of the facilities.

The drugs prescribed from the essential list were around 30%. The top three factors as indicated by the providers were socioeconomic status of the patient, 19.3% previous experience of treating patients 19.0% and severity of disease 18.3%.

It has been observed that International medical graduates, physicians with high-volume practices and those who were in practice longer were more likely to prescribe antibiotics inappropriately (Genevieve and Robyn 2007). Interventions to rectify over prescription of antibiotics and syrup formulations, adequate labeling of drugs and easy access to an essential drugs list are necessary to further improve rational use of drugs (Karande et al., 2005). It has also been proposed that education and awareness programs for doctors and patients may help to prevent the inappropriate use of psychoactive drugs in Karachi, Pakistan and recommended regulatory intervention to control use of these drugs (Khuwaja et al., 2007). An educational intervention combining an antibiotic guide and a prescribing profile was effective in decreasing non adherent antibiotic prescriptions (Johanne et al., 2007). Repetition of the intervention at regular intervals may be necessary to maintain its effectiveness. Quality improvement efforts are effective at reducing antibiotic use in ambulatory settings, although much room for improvement remains. Strategies using active clinician education and targeting management of all ARIs may yield larger reductions in community-level antibiotic used (Sumant et al., 2008). Awareness of the rational use of antibiotics is mandatory, basically aimed at reducing the overall prescribing of antibiotics and encouraging those with a narrower spectrum. In one of the most recent studies, it was emphasized on principles of more conservative prescribing which includes thinking beyond drugs, practice more strategic prescribing, caution and skepticism regarding new drugs, sharing agenda with the patients and weigh longer term, broader effects (Gordon and William, 2009).

The existing institutional mechanisms should be strengthen to protect patients, develop and implement an appropriate regulatory framework and strengthen the public health care delivery system. A list of essential drugs should be distributed to all health care providers both in the public and private sector either free of cost and to students studying in the final year of Pharmacy, MBBS and BDS. The association should develop a code of medical ethics for health care providers which should be displayed for patients/clients in health facility of every registered medical practitioner.

**Limitations of the study**

The consultants are very busy in their private practice and at time difficult to collect the specific number of prescription from them according to WHO guidelines and the fieldwork for this study involved lots of traveling in the

various cities and was spread over a period of nine months. The prescription practices may have changed as a result of seasonal variation. Therefore, these results can not necessarily be extrapolated to all cities of the country. Administering the same survey instruments to other cities in the future would be useful in determining its trends of prescribers.

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