

## An audit of outpatient prescriptions and drug use pattern at a tertiary care centre of Central India

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### Abstract

**Objective:** A cross sectional observational survey to assess the drug use pattern and habit of writing rational prescription followed by a feedback to the prescribers to ensure the best practice in writing prescriptions.

**Materials and Methods:** Prescriptions were analyzed in the month of January 2016 at All India Institute of Medical Sciences, Bhopal, MP, India using the WHO core prescribing indicators. In addition, quality of prescription writing was also assessed in terms of legibility and completeness of information e.g. whether diagnosis, strength, frequency and duration of drug prescribed was written or not. The collected data was analyzed in Microsoft Excel 2007. Statistical analysis had been done to obtain frequency, average/mean, and percentage.

**Result:** Total number of prescription analyzed were 503, contained a total of 1118 drugs i.e. on an average 2.2 drugs per prescription. Drugs prescribed by generic name and injectable route were 71(6.3%) and 9(1.0%) respectively. A total of 163 antimicrobials were prescribed in 117(23.2%) prescriptions out of which 108 were anti-bacterials. A large proportion (60.1%) drugs prescribed were not included in the NLEM. Incomplete and illegible prescription were 357(70.9%) and 219(43.5%) respectively.

**Conclusion:** This prescription audit revealed that polypharmacy, overuse of injections and unnecessary use of antimicrobials were not a concern in the target prescribers. But there is a scope for improvement in generic prescribing, use of essential medicines, better quality of prescription writing in terms of completeness of information provided and legibility of prescriber details.

### Introduction

Prescribing drugs is the most common therapeutic approach offered to patients by the doctors. It is therefore imperative that this tool be used to make the best possible use of a valuable resource that is a drug. One way of ensuring this is by regular and periodic audits of prescriptions.

By throwing light on problems of irrational prescribing, a prescription audit helps in promoting most efficient use of therapeutic agents, reducing prescribing costs by reducing unnecessary use of antibiotics and injections in prescriptions, encouraging generic prescriptions and reducing polypharmacy. This in turn improves patient care and management and reduces noncompliance and wastage of valuable resources.

Besides irrational prescribing, many ADEs are caused by medication errors, which in turn are often due to errors in prescription writing, like illegibility, ambiguous abbreviations, lack of date of prescription, dose, route, frequency of administration and duration of treatment.<sup>1,2</sup>

At the prescriber level, a prescription audit enables continuing professional and personal development of the practitioner and helps to identify, analyze and plan future development needs. Since a prescriber is clinically and legally responsible for his/her own prescription, every practitioner needs to demonstrate that they prescribe effectively and safely, by regularly analyzing and changing their practice where necessary.

Prescription audit provides a means of developing a personal learning plan for self-appraisal and the appraisal process.

Well-documented evidence shows that audits and feedback on prescribing performance can result in a small to moderate change in the prescribing practices of physicians (ranging from a 16% decrease to 70% increase in compliance with prescription guidelines).<sup>3</sup> A review by the Cochrane Collaboration<sup>[3]</sup> concluded that intensive feedback may have a greater potential given that the tested "feedback" interventions are usually confidential and contain only benchmarking on average.

AIIMS Bhopal is a newly established tertiary care Institute in Central India, where prescribing practices are still in an evolution stage. A prescription audit at this stage followed by a feedback to the prescribers would go a long way in ensuring that best practices in prescribing crystallize in the long run. Thus, with this objective in view, a prescription audit of outpatient prescriptions was carried out in the institute.

### Materials and Methods

The Prescription audit was carried out at All India Institute of Medical Sciences, Bhopal, MP, India. It was a cross sectional observational survey to assess the drug prescribing pattern at tertiary care centre of central India.

Data collection was carried out in the month of January, 2016. On each working day, 25 prescriptions

were selected by simple random sampling from the in-house pharmacy, and the necessary information was filled in a pre validated format. Prescriptions were analyzed using the WHO core prescribing indicators:<sup>4</sup>

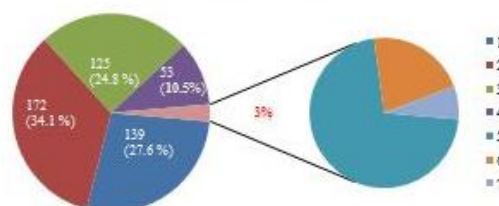
1. Average number of drugs per encounter.
2. Percentage of drugs prescribed by generic name.
3. Percentage of encounters with an antibiotic prescribed.
4. Percentage of encounters with an injection prescribed.
5. Percentage of drugs prescribed from essential drugs list or formulary

In addition, quality of prescription writing was also assessed in terms of legibility and completeness of information e.g. whether diagnosis, strength, frequency and duration of drug prescribed was written or not.

The collected data was analyzed in Microsoft Excel 2007. Statistical analysis had been done to obtain frequency, average/mean, and percentage.

## Results

Total number of prescription analyzed were 503 which contained a total of 1118 drugs i.e. on an average 2.2 drugs per prescription (**Table 1**). Out of 503 prescriptions 139 (27.6%) contained 1 drug, 172 (34.1%) 2 drugs, 125 (24.8%) 3 drugs, 53(10.5%) 4 drugs and only 3% contained more than 4 drugs (**Fig. 1**).



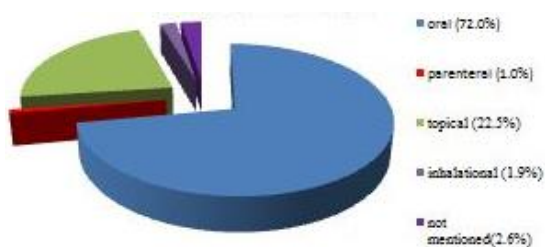
**Fig. 1: Number of drugs per prescription**

Generic (considering paracetamol and aspirin as generic) names of drugs were used in only 71 (6.3%) out of the all drugs prescribed, while the rest 1047 (93.7%) were branded (**Table 1**).

**Table 1. Comparing outcome of the present study with standard derived as ideal**

WHO prescribing indicators	Frequency (n)	Average /Percentage (%)	Ideal <sup>15</sup>
Average number of drug per encounter		2.22	1.6- 1.8
Drug prescribed by generic name	71	6.3%	100%
Encounters with an antibiotic prescribed	117	23.2%	20.0 - 26.8%
Encounters with an injection prescribed	9	1%	13.4- 24.1%
Drugs prescribed from NLEM	365	32.6%	100%

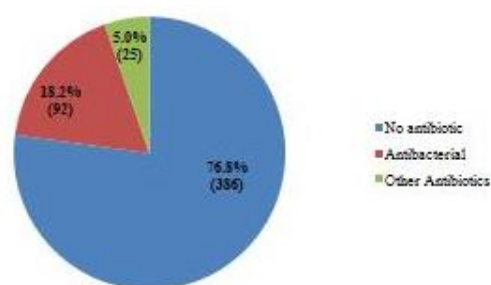
Out of 1118 drugs prescribed, 72.0% were given by oral route, 22.5% by topical route, 1.9% by inhalational route and only 1.0% by injections. In 2.6% of the medicines prescribed, route of administration was not mentioned (**Fig. 2**).



**Fig. 2: Routes of administration**

A total of 163 antimicrobials were prescribed in 117(23.2%) prescriptions (**Table 1**). Of these, 92 (18.2%) prescriptions contained an antibacterial and the rest contained antifungals and/or antiprotozoals (**Fig.**

3). Out of a total of 163 antimicrobials, there were 108 antibacterials, 31 antifungals and 24 antiprotozoals. Amongst the antibacterials, amoxicillin-clavulanic acid fixed dose combination was prescribed in the majority (38) followed by azithromycin (16), clindamycin (16) and ofloxacin (10) (**Table 2**).



**Fig. 3: Prescription containing Antibiotics**

**Table 2: Antimicrobials prescribed in 503 prescriptions**

S. N.	Name	Number of antimicrobials (n)#
<b>I</b>	<b>Antibacterial</b>	<b>108</b>
1.	Amoxicillin - clavulanic acid	38
2.	Azithromycin	16
3.	Clindamycin	16
4.	Fluoroquinolones*	17
5.	Tetracyclines**	9
6.	Cephalosporins	4
7.	Miscellaneous	8
<b>II</b>	<b>Antifungal</b>	<b>31</b>
<b>III</b>	<b>Antiprotozoal</b>	<b>24</b>
	<b>Total (I +II+III)</b>	<b>163</b>

#One prescription may contain more than one antimicrobial

\*Ofloxacin-10, Levofloxacin-4, Ciprofloxacin-3

\*\*Doxycycline-6, Minocycline-3

Large proportions (60.1%) of drugs prescribed were not included in the National List of Essential Medicines (NLEM). We were not able to find generic names of 81(7.2%) drugs (Table 3) and hence unable to determine if they are included in the NLEM.

**Table 3: No. of drugs included in National List of essential medicine**

	NLEM (n)	Percentage (%)
Not Included	672	60.1
Included	365	32.6
NA	81	7.2
Total	1118	100

Fixed Dose Combinations (FDCs) comprised 477 (42.6%) of the total drugs prescribed, out of which only 246 (51.5%) were approved by DCGI (Director Control General of India) as rational FDCs.

A diagnosis or complaint was not mentioned in 218 (43.4%) prescriptions. Strength of the medicine was not mentioned for 600 (53.6%) drugs, while frequency of intake was omitted for 210(18.7%) and duration of therapy was missing in 403 (36.0%) of the drugs. (Table 4) All these prescriptions were considered as incomplete, amounting to 357(70.9%) incomplete prescriptions. Prescribers name was illegible in 219 (43.5%) prescriptions.

**Table 4: Duration, Frequency and Strength of Drugs prescribed**

	Written [n, (%)]	Not written [n, (%)]	Total drugs
<b>Duration</b>	715 (63.9.0%)	403 (36.1%)	1118
<b>Frequency</b>	908	210	1118

	(81.1%)	(18.7%)	
<b>Strength</b>	518 (46.4%)	600 (53.6%)	1118

## Discussion

A major concern related to irrational prescriptions is unnecessary use of antibiotics and the overuse of injections.<sup>5</sup> Although it is a global problem, irrationality in prescriptions is seen to be particularly rampant in low and middle income countries,<sup>5-7</sup> and is associated with many avoidable adverse drug events and more importantly the development of antimicrobial resistance (AMR). Increased AMR and the spread of blood-borne infections has triggered a surge of research into interventions on prescribing practices.<sup>3,8-11</sup>

Greater health care costs, loss of productivity and poorer health outcomes associated with the irrational use of antibiotics and injections have also attracted great concern globally.<sup>12</sup>

Although there is no standard criteria to define what exactly should be the number of drugs per prescription to consider it as polypharmacy, generally five or more drugs per encounter can be considered as polypharmacy.<sup>13,14</sup> In our study only 3% prescriptions carried more than 4 drugs and the average number of drugs per prescription were 2.2. This average is very close to the recommended limit of 2.0 as mentioned by WHO(4), although it is out of the range of standard (1.6 to 1.8) derived as ideal.<sup>15</sup> This average is very low as compare to other similar studies done at tertiary care centre of India.<sup>16,17</sup> Hence we can conclude that polypharmacy was not a problem in the study population.

Only 6.3% drugs were prescribed by generic name which is far away from the standard (100%) derived as ideal<sup>15</sup> but comparable to other Indian studies that reported 4.1%<sup>16</sup> and 3.7%<sup>17</sup> usage of generic drugs. This is despite the directive by the government of India to prescribe by generic name only. The low percentage of generic prescribing can be partially explained by the widespread concern over quality of generic medicines in India.<sup>19</sup>

Most of the drugs were given by oral route as expected as it was an OPD based prescriptions audit. Only 1.0% drugs were given by parenteral route which is lower than the standard (13.4 - 24.1%) derived to serve as ideal.<sup>15</sup> 23.2% of the prescription had antibiotics prescribed which is within the range of standard (20.0 - 26.8 %) derived to serve as ideal.<sup>15</sup> Thus our study showed that the parenteral route and antibiotics was not being used unnecessarily to treat patients attending outpatient clinics at AIIMS, Bhopal.

More than half of the drugs prescribed were not from the National List of Essential Medicine 'NLEM 2015'.<sup>19</sup> In this study habit of prescribing from NLEM by target population was shown to be less as compare to other Indian studies.<sup>16,17</sup> This might be due to lack of awareness about NLEM or the attitude towards writing

drugs from NLEM has not yet been developed. At the time of carrying out the audit, there was no Institutional list of Essential Medicines, and prescribers were expected to prescribe as far as possible from the NLEM.

A large number of fixed dose combinations (42.6%) had been prescribed and almost half amongst them were not approved by DCGI.<sup>20</sup>

In this study we found 70.9% prescriptions incomplete in one or more aspect that is, in term of either absence of diagnosis /complaints in the prescription or absence of duration, frequency and strength of the drug prescribed. Our study showed that habit of writing drug strength is very less as compare to writing duration or frequency. Almost in half of the prescription the prescriber's details were illegible.

### Conclusion

This prescription audit revealed that polypharmacy and overuse of injections were not a concern in the target prescribers. Use of antimicrobials was also within reasonable limits, given the fact that the audit was carried out in a tropical country where infectious diseases make up a significant proportion of medical diagnoses.

But our audit did bring out the areas where there is a scope for improvement that is generic prescribing, use of essential medicines, restraint in use of irrational fixed dose combinations and better quality of prescription writing in terms of completeness of information provided and legibility of prescriber details.

### References

1. Agrawal A, Aronson JK, Britten N, Ferner RE, De Smet PA, Fialová D, et al. Medication errors: Problems and recommendations from a consensus meeting. *Br J Clin Pharmacol*. 2009;67(6):592–8.
2. Pirmohamed M, James S, Meakin S, Green C. Adverse drug reactions as cause of admission to hospital. *BMJ Br Med J*. 2004;329(7463):460.
3. Ivers N, Jamtvedt G, Flottorp S, Jm Y, Sd F, Ma OB, et al. Audit and feedback : effects on professional practice and healthcare outcomes ( Review ). *Cochrane Database Syst Rev*. 2012;(6):CD000259.
4. who. How to investigate drug use in health facilities- WHO [Internet]. EDM reser. 1993.16-8 p. Available from: <http://apps.who.int/medicinedocs/pdf/s2289e/s2289e.pdf>
5. Holloway KA, Henry D. WHO Essential Medicines Policies and Use in Developing and Transitional Countries: An Analysis of Reported Policy Implementation and Medicines Use Surveys. *PLoS Med*. 2014;11(9).
6. Hutin YJF. Use of injections in healthcare settings worldwide, 2000: literature review and regional estimates. *Bmj [Internet]*. 2003;327(7423):1075–0. Available from: <http://www.bmj.com/cgi/doi/10.1136/bmj.327.7423.1075>
7. Dijk KH and L Van. The world medicines situation: rational use of medicines. *World Med Situat*. 2011;2(2):24–30.
8. Harris DJ. Initiatives to improve appropriate antibiotic prescribing in primary care. *J Antimicrob Chemother*. 2013;68(11):2424–7.
9. Lu CY, Ross-Degnan D, Soumerai SB, Pearson S-A. Interventions designed to improve the quality and efficiency of medication use in managed care: A critical review of the literature – 2001–2007. *BMC Health Serv Res [Internet]*. 2008;8(1):75. Available from: <http://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-8-75>
10. Ryan R, Santesso N, Lowe D, Hill S, Grimshaw J, Prictor M, et al. Interventions to improve safe and effective medicines use by consumers: an overview of systematic reviews. *Cochrane database Syst Rev*. 2014;4(4):CD007768.
11. Van Der Velden AW, Pijpers EJ, Kuyvenhoven MM, Tonkin-Crine SKG, Little P, Verheij TJM. Effectiveness of physician-targeted interventions to improve antibiotic use for respiratory tract infections. *Br J Gen Pract*. 2012;62(605):801–7.
12. Who. The Pursuit of Responsible Use of Medicines: Sharing and Learning from Country Experiences. *Vet Rec [Internet]*. 2012;169(9):78. Available from: [www.wiredhealthresources.net/.../WHO-FS\\_MedicinesRationalUse.pdf%5Chttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3780506&tool=pmcentrez&rendertype=abstract](http://www.wiredhealthresources.net/.../WHO-FS_MedicinesRationalUse.pdf%5Chttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3780506&tool=pmcentrez&rendertype=abstract)
13. Dagli RJ, Sharma A. Polypharmacy : A Global Risk Factor for Elderly People. 2014;6(6):6–7.
14. WHO, Report HT. A GLOSSARY OF TERMS FOR COMMUNITY HEALTH CARE AND SERVICES FOR OLDER PERSONS. Vol. 5. 2004. p. 45.
15. Isah A, Ross-Degnan D, Quick J, Laing R, Mabadeje A. The development of standard values for the WHO drug use prescribing indicators. *Int Conf Improv Use Med [Internet]*. 2004;1–6. Available from: [http://archives.who.int/icium/icium1997/posters/1a2\\_txt.html](http://archives.who.int/icium/icium1997/posters/1a2_txt.html)
16. Balbir K, Rani W. Research Article Prescription Audit for Evaluation of Prescribing Pattern of the. *J Drug Deliv Ther*. 2013;3(5):77–80.
17. Shikha Mishra PS. Prescription audit and drug utilization pattern in a tertiary care teaching hospital in Bhopal. *IJBCP Int J Basic Clin Pharmacol Res Artic*. 5(5):1845–9.
18. Dhamija P, Sharma PK, Kalra S. Only generics (drugs/names): Is India ready? *Indian J Endocrinol Metab [Internet]*. 2015;19(5):541–5. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/26425461%5Chttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC4566332>
19. Government of India M of H& FW. National List of Essential Medicines. 2015;1–117. Available from: <http://pharmaceuticals.gov.in/pdf/NLEM.pdf>
20. November T. Fixed Dose Combinations Approved By Dcg ( I ) Since 1961. 2014;(1):1–92.