

**A Study on the Antibiotic Prescription by the Informal Health
Care Providers in Ujjain District, Madhya Pradesh**

**Internship Training
at
R. D. Gardi Medical College, Ujjain**

**By
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**Under the guidance of
Dr. Monica Choudhary**

**Post Graduate Diploma in Hospital & Health Management
2012–14**


**Institute of Health Management Research
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TO WHOMSOEVER MAY CONCERN

This is to certify that **Dr.Shweta Khare**, student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from Institute of Health Management Research, Jaipur has undergone dissertation at **R.D.Gardi Medical College, Ujjain, M.P.** from **11th February 2014 to 20th May 2014.**

The candidate has successfully carried out the study designated to him (**A study on the antibiotic prescription by the informal health care providers in Ujjain district, M.P.**) during dissertation and her approach to the study has been sincere, scientific and analytical.

The internship is in fulfilment of the course requirements.

I wish him all success in all his future endeavours.



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CERTIFICATE OF COMPLETION OF INTERNSHIP

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In recognition of having successfully completed her internship in

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A study on the antibiotic prescription by the informal health care providers

in Ujjain District, Madhya Pradesh

(11th February, 2014 – 20th May, 2014)

R.D. Gardi Medical College, Ujjain

She has also worked on other assignments both at field and desk level during the period of her internship.

She comes across as a committed, sincere and diligent person who has strong drive and zeal for learning.

We wish her all the best for future endeavours.

Dr. Vishal Diwan
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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "**A study on the antibiotic prescription by the informal health care providers in Ujjain District, Madhya Pradesh**", and submitted by **Dr. Shweta Khare** Enrolment No. **IIHMR/PGDHM/2012-14/17-1377** under the supervision of **Dr. Monika Chaudhary** for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from **11th February 2014 to 20th May 2014** embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

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.....and submitted by Dr. Shweta Khare
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under the supervision of
for award of Postgraduate Diploma in Hospital and Health Management of the
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embodies my original work and has not formed the basis for the award of any degree,
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ABSTRACT

Background: In India, heterogeneous healthcare providers in the public and dominant private sectors serve a diverse population. Informal health care providers are a large group among them, not legalized to practice allopathic medicine. The World Health Organization (WHO) recently reemphasized the growing threat of antimicrobial resistance (including antibiotic resistance) partly due to inappropriate medicine use by these informal health care providers. So, we prospectively explored prescribing pattern, with an emphasis on informal health care providers. To present and describe the antibiotic prescription by informal health care providers in rural Ujjain, India.

Objectives: To understand the treatment choices of informal providers for various diseases treated by them. To describe the antibiotic prescribed in term of frequencies, its groups, and the route of administration. To understand the practice of which antibiotic is more frequent. To determine whether drugs they use may contribute to antibiotic resistance.

Methods: A descriptive study was conducted in 12 villages from 3 blocks of Ujjain district (Mahidpur, Ghatiya and Tarana), in Madhya Pradesh state in India, which were selected purposively. Target population was informal health care providers. Survey was conducted to line list the informal health care providers currently present in the Ujjain district (*R.D.Gardi, medical college, DSS data 2012-2013, unpublished*). Twenty four of the informal health care provider from the selected 3 blocks were approached and were given special designed prescription pads in duplicates. Only 18 providers returned the prescription pads. 2089 prescriptions were studied. **Results:** A total of 18 IHCPs returned the prescription pads, provided to them during the study. Among 18 IHCP, majority were the CHV (12). 46% of the patients treated were in the middle age group (16to45). Children treated were 11.6%. The common illnesses seen were Cardiorespiratory (cough and cold, asthma etc.) which was 33% Illnesses treated were further classified into the infectious (antibiotic plausible) and non infectious where antibiotic treatment was not mandatory. 66% of them were infectious and 33% illnesses reported were found to be non infectious. Among the illnesses found to be non infectious, 58% were prescribed antibiotics. Among the 2089 prescription studied, 73% received some kind of antibiotic and out of them 26% received more than one antibiotic. 28 types of antibiotics were prescribed by the providers to treat various illnesses. Ciprofloxacin was most

frequently prescribed antibiotic (14.4). Oral was the most common route of administration of drug (63%), followed by intra muscular (32%). Doses of the antibiotics prescribed were found to sub standard (41%). **Conclusion:** The antibiotic prescription pattern by the IHCP's was found to be influenced by their medical qualification and years of work experience. The treatment provided was not according to the clinical guidelines. Multifaceted interventions are needed to reduce unnecessary antibiotic use; peer education and feedback on doctors' use of antibiotics can promote behavior change. Educational interventions for the public should include a public relations campaign with simple messages; clinic based patient education, and community outreach activities. Health organizations should develop policies to support judicious antibiotic use and evaluate whether existing policies may unintentionally promote overuse of antibiotics.

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The internship was started with a vision to be able to learn about the practical aspects of healthcare delivery system in a detailed manner. I hereby take this opportunity to express my deep sense of gratitude to all those who have been instrumental in the successful completion of my internship. Any accomplishment requires efforts of various individuals and this work is no exception

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Dr. Shweta Khare

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List of symbols and abbreviations

IHCP : Informal Health Care provider

CHC : Community Health Centre

CHW : Community Health Worker

VHW : Village health visitor

RMP : Rural Medical Practitioners

DHMS : Diploma in Homeopathic Medicine and Surgery

DSS : Demographic Surveillance Site

ATC : Anatomical Therapeutic Chemical Classification

DDD : Defined Daily Dose

IM : Intramuscular

IV : Intravenous

MDR : Multi Drug Resistance

MP : Madhya Pradesh

PHC : Primary Health Care

SC : Sub-Centre

WHO : World Health Organization

g : gram

O : oral route of drug administration

P : parental route of drug administration

R : rectal route of drug administration

1.1 Introduction

India is a country with wide disparities, and social inequalities. With a total population of 1210.2 million (Urban- 32% and Rural- 68%, according to census2011). The population of India at 1210.2 million is almost equal to the combined population of USA, Indonesia, Brazil, Pakistan, Bangladesh and Japan. The percentage of persons below the Poverty Line in 2011-12 has been estimated as 25.7% in rural areas, 13.7% in urban areas and 21.9% for the country as a whole. In M.P. 31.7% of total population lies below poverty lines (Rural-35.7% and Urban-21%) (According to Press Note on Poverty Estimates, 2011-12, Government of India, Planning Commission, July 2013).

Health care delivery system in Rural India

As per the Rural Health Statistics (RHS) 2012, as on 31.3.2012 the status of public health facilities are as under:

- 1, 48,366 Sub Centres (SCs)
- 24,049 Primary Health Centres (PHCs)
- 4,833 Community Health Centres (CHCs)
- 987 Sub-divisional Hospitals (SDHs)
- 624 Districts Hospitals (DHs).

There is shortfall of 43776 SCs (23%), 7954 PHCs (26%) and 3044 CHCs (40%) across the country [Rural Health Statistics (RHS) 2012]. Informal (without formal training) healthcare providers are the dominant sources of healthcare services for rural population who are mostly poor. Thus, it is important to know about the informal healthcare providers, their background, quality of services, and presence of accountability mechanism.

Informal Health Care Providers

Informal health care providers are without state accredited medical qualification and t are not legalized to practice allopathic medicine. Different types of informal health care providers identified in the community are: Community Health Worker (CHW), Village Health Worker (VHW), Rural Medical Practitioner (RMP), traditional healers, compounders, patent medicine vendors etc. Informal Health Care Provider's (IHCP) are a heterogeneous group of providers with differences in type of training, regulatory frameworks, and services provided. There are three principal reasons for using IHCPs: convenience,

affordability, and social and cultural effects. Compared to either the public or formal private sectors, IHCP's have flexible working hours and are likely to be open at all hours, more likely to have medicines in stock, generally geographically closer, and offer more rapid service. Very little evidence is present on the quality of care provided by the IHCPs, there is a general acceptance that they provide substandard treatment.

Informal health care providers are working because of the gaps in health care provision by qualified providers (Mahmood et al., 2010, Gidwani). In Madhya Pradesh three quarters of the qualified medical doctors were working in the private sector and 80% of them were in the urban areas serving only one quarter of the state population. While the unqualified health care providers working in rural areas constituted more than 90%. This percentage was more than 80% in some other parts of India (De Costa and Diwan., 2007).

Regulating the informal health care providers work under the situation of the inundated health system and the lack of the basic information about the private health sector in general in addition to enforce those regulations is a challenge (2002, De Costa et al., 2008b, Deshpande. et al., 2004, Cross. and MacGregor., 2009).

Rational use of drugs

Rational use of medicines refers to the correct, proper and appropriate use of medicines. Rational use requires that patients receive the appropriate medicine, in the proper dose, for an adequate period of time, and at the lowest cost to them and their community.

Definition of rational use of medicines:

Patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community.” (WHO, 1985).

Incorrect use of medicines

WHO estimates that more than half of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take them correctly. This incorrect use may take the form of overuse, underuse and misuse of prescription or non-prescription medicines.

Common types of irrational medicine use are:

- The use of too many medicines per patient (poly pharmacy).
- Inappropriate use of antimicrobials, often in inadequate dosage, for non-bacterial infections.
- Over-use of injections when oral formulations would be more appropriate.
- Failure to prescribe in accordance with clinical guidelines.
- Inappropriate self-medication, often of prescription only medicines.

In developing countries, the proportion of patients treated according to clinical guidelines for common diseases in primary care is less than 40% in the public sector and 30% in the private sector. For example:

- Less than 60% of children with acute diarrhea receive necessary oral rehydration therapy yet more than 40% receive unnecessary antibiotics.
- Only 50% of people with malaria receive the recommended first-line antimalarial.
- Only 50–70% of people with pneumonia are treated with appropriate antibiotics, yet up to 60% of people with viral upper respiratory tract infection receive antibiotics inappropriately.

Recent antibiotic use is a well documented risk factor for infection or colonization with resistant pathogens. Despite this recognition, unnecessary antibiotic prescribing remains common. 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 anti microbial resistance in community pathogens. An important inappropriate use of antibiotics is of viral or self-limiting infections.

It is estimated that more than 50% of antibiotics worldwide are purchased privately without a prescription, from pharmacies or street vendors in the informal sector. The situation in developing countries is of particular concern because the use of antibiotics without medical guidance is largely facilitated by inadequate regulation of the distribution and sale of prescription drugs. Factors that contribute to antibiotic overuse include lack of education, patients' expectations, past experience, and economic incentives.

Antibiotic Resistance

Antibiotic resistance is a form of drug resistance whereby some (or, less commonly, all) sub-populations of a microorganism, usually a bacterial species, are able to

survive after exposure to one or more antibiotics; pathogens resistant to multiple antibiotics are considered multidrug resistant (MDR) or, more specifically, Superbug.

Antibiotic resistance is a serious and growing phenomenon in contemporary medicine and has emerged as one of the pre-eminent public health concerns of the 21st century, in particular as it pertains to pathogenic organisms. A WHO report released April 30, 2014 states, "this serious threat is no longer a prediction for the future, and it is happening right now in every region of the world and has the potential to affect anyone, of any age, in any country. Antibiotic resistance—when bacteria change so antibiotics no longer work in people who need them to treat infections—is now a major threat to public health."

ATC (Anatomical Therapeutic Chemical Classification) and DDD (Defined Daily Dose)

The **Anatomical Therapeutic Chemical (ATC) Classification System** is used for the classification of drugs. It is controlled by the WHO Collaborating Centre for Drug Statistics Methodology (WHOC), and was first published in 1976.

This pharmaceutical coding system divides drugs into different groups according to the organ or system on which they act and/or their therapeutic and chemical characteristics. Each bottom-level ATC code stands for a pharmaceutically used substance, or a combination of substances, in a single indication (or use). This means that one drug can have more than one code: acetylsalicylic acid(aspirin), for example, has A01AD05 as a drug for local oral treatment, B01AC06 as a platelet inhibitor, and N02BA01 as an analgesic and antipyretic. On the other hand, several different brands share the same code if they have the same active substance and indications.

Classification: In this system, drugs are classified into groups at 5 different levels:

First level

The first level of the code indicates the anatomical main group and consists of one letter. There are 14 main groups.

Second level

The second level of the code indicates the therapeutic main group and consists of two digits.

Example: C03 Diuretics

Third level

The third level of the code indicates the therapeutic/pharmacological subgroup and consists of one letter.

Example: C03C High-ceiling diuretics

Fourth level

The fourth level of the code indicates the chemical/therapeutic/pharmacological subgroup and consists of one letter.

Example: C03CA Sulfonamides

Fifth level

The fifth level of the code indicates the chemical substance and consists of two digits.

Example: C03CA01 Furosemide

Defined Daily Dose

The ATC system also includes defined daily doses (DDDs) for many drugs. This is a measurement of drug consumption based on the usual daily dose for a given drug. According to the definition, "The DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults.

1.1.1Background

Table1.1: Health Infrastructure of Madhya Pradesh

Particulars	Required	In position	Shortfall
Sub-centre	12314	8869	3445
Primary health Centre	1977	1156	821
Community Health Centre	494	333	161
Health worker (Female)/ANM at Sub-centre & PHC	10025	10204	*
Health Worker (Male) at Sub-centre	8869	333	5136

(Source: RHS Bulletin, March 2012, M/O Health & F.W., GOI)

1.1.2 Research problem

Absence of regulatory framework and shortage of qualified healthcare providers in rural areas, gives opportunities to informal health care providers (without a formal education in medicine) to serve. Informal providers reported inadequate drug provision, poor adherence to clinical national guidelines, and that there were gaps in knowledge and provider practice. Studies on antibiotic prescription by informal healthcare providers are required to device effective policy interventions.

1.1.3 Review of literature

According to a study “Quality of Informal Healthcare Providers in Rural Bangladesh: Implication in the Future Health System” (M. Iqbal , S.M.A. Hanifi, S.Hoque, and Abbas Bhuiya, 12th ASCON, 2009). Inappropriate use of drugs is highly prevalent among the informal healthcare providers. This has impoverishing effects and life-threatening consequences for those who use their services. There is a need for interventions to reduce harmful and inappropriate practices.

The study “On the role of informal providers in health care delivery” (Article by centre for the health market innovations organisation). Aim of the study was to bring further attention to the prevalence and practices of informal providers, encourage greater focus on this issue among global and national policymakers, and lead to more creative solutions for the challenges posed by the informal health care sector. Founded that IPs are relatively knowledgeable about certain care standards and undertake appropriate practice in some areas. Some governments have supported a growing formalization of their practices.

In another study named “What Is the Role of Informal Healthcare Providers in Developing Countries? A Systematic Review” (May Sudhinaset, Matthew Ingram, Heather Kinlaw Lofthouse, Dominic Montagu, and PLOS/one February 6, 2013) found that IPs reported inadequate drug provision, poor adherence to clinical national guidelines, and that there were gaps in knowledge and provider practice; however, studies also found that the formal sector also reported poor provider practices.

In the study “Antibiotic use, resistance development, and environmental factors: a qualitative study among healthcare professionals in Orissa, India” (Krushna Chandra Sahoo, et al. BMC Public Health 2010) concluded that the interviewees perceived that although behavioral and social environmental factors are major contributors to resistance development, changes in the physical and natural environment also influence development of antibiotic resistance. The respondents also perceived that there is a lack of information about, and poor awareness of, what constitutes prudent use of antibiotics. They suggested a need for information, education, dissemination and proper implementation and enforcement of legislation at all levels of the drug

delivery and disposal system in order to improve antibiotic use and prevent pharmaceutical contamination of the environment.

1.1.4 Rationale of Study

Since, there is a growing concern about the dangers of healthcare practices among informal health care provider, leading to the emergence of antimicrobial resistance. It is important to improve the knowledge and accountability of informal health care providers, and to make their products and services more accessible, more affordable and safer, in order to reduce the irrational use of antibiotics; an energetic prompt action on the first, will tend to prevent the latter adverse outcomes. Greater attention needs to be given to the entire spectrum of informal health care providers practicing in the society.

1.1.5 Research Question

What is the antibiotic prescription pattern practiced by the informal providers in the rural areas in Ujjain District?

1.1.6 Hypothesis

Irrational use of antibiotic by the informal health care providers, who are not legalized to practice allopathic medicine, is leading to the emergence of antibiotic resistance and inadequate treatment of diseases leads to increase burden of the diseases, and increase risks for spreading of blood borne infections with the high use of injectable medicines.

1.1.7 Research Aim

To present and describe the antibiotic prescription by informal health care providers in rural Ujjain, India.

1.1.8 Research Objectives

- 1) To understand the treatment choices of informal providers for various diseases treated by them
- 2) To describe the antibiotic prescribed in term of frequencies, its groups, and the route of administration.
- 3) To understand the practice of which antibiotic is more frequent.
- 4) To determine whether drugs they use may contribute to antibiotic resistance.

2.1 Methodology

- a. Type of study - Descriptive study, which is quantitative.
- b. Location of study -

Study was conducted in the Ujjain district of Madhya Pradesh. Madhya Pradesh is a state in central India. It is the second largest state in the country by area. With a total population of 7.26 crores (Census 2011) . It is the sixth largest state in India by population. The Infant Mortality Rate of the State is 59 (SRS 2011) and Maternal Mortality Ratio is 269 (SRS 2007-09)

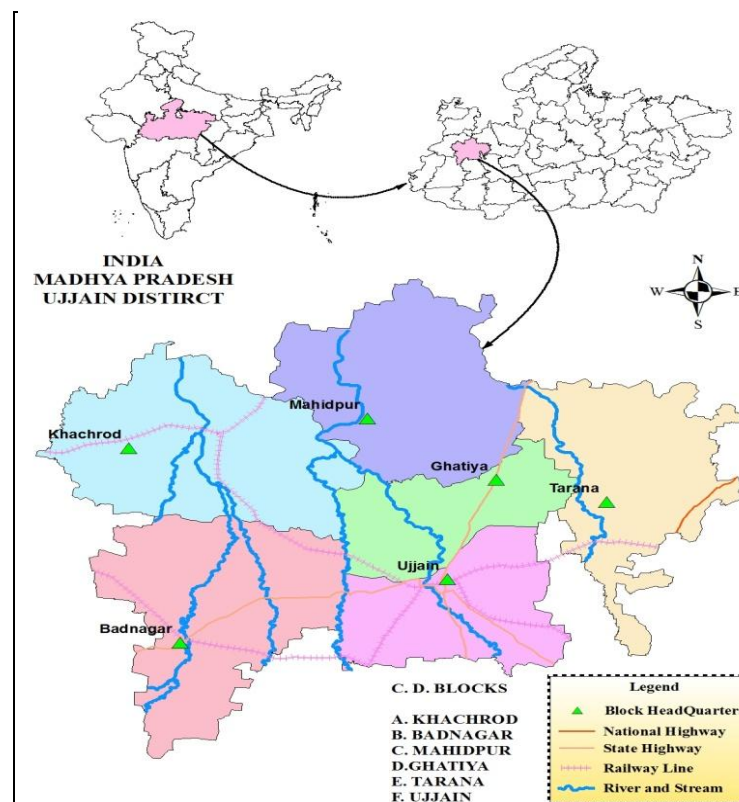


Fig 2.1: Basic map of Ujjain district, Madhya Pradesh, India

Ujjain district is situated in the western part of Madhya Pradesh. With a total population of 1986864 (census 2011), rural population 61%. It consists of 6 blocks with a total number of 1101 villages. Ujjain district has five CHC, twenty-two PHC, and one hundred seventy one SHC. Study was carried out in 12 villages from 3 blocks of Ujjain district (Mahidpur, Ghatiya and Tarana), Madhya Pradesh State, India, which were selected purposively.

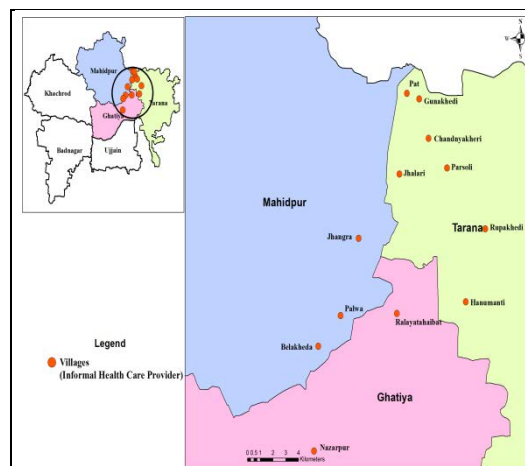


Fig 2.2: Map of Ujjain district showing the distribution of informal health care providers in 12 villages of 3 blocks of Ujjain district.

c. Medium of instruction- Hindi

d. Variables - Characteristic of informal healthcare providers (Age, Sex, Medical qualification, years of experience), Age group of patients treated, Type of illnesses treated, Number of antibiotic prescribed, Route of administration, strength and duration of antibiotics prescribed.

e. Target population - Informal health care providers

f. Sample Design - Purposive sampling

2.1.1 Sampling

- Study was conducted in 3 Blocks of Ujjain district i.e., Mahidpur, Ghatiya and Tarana from Jan 2012 to June 2012. Considering the time and the resources available, first a survey was undertaken to map the IHCP's currently present in the Ujjain district (unpublished results 2012-13). We found close to four thousand informal health care providers working in Ujjain. Among all the health workers in the selected 3 blocks of Ujjain district, 24 were approached and were handed a specifically designed prescription pad from which 18 returned the prescription. Itotal 2089 prescriptions for 2054 cases were studied.

2.1.2 Tools and Technique

I. Ethical Considerations

Ethical approval to conduct the study was obtained from the ethics committee of R. D. Gardi Medical College Informed consent was taken before giving the prescription pads. If anyone disagreed to become part of the data collection process they were not forced by any means and withdrawal from the study was possible at any point. Prior information was given before visiting any informal health care provider. Names of patient were not taken in the research process and in the final presentation.

II. Data collection tool

Specially designed prescription pads were used. Each pad having 50 prescriptions, with a duplicate copy of each page, one to be handed to the patient and the other to be given to the research team at the end of the data collection period. Each prescription included space for the name of the patient, age, sex and the disease or symptoms, in addition space to record the antibiotics or other drugs they prescribed with the dose, route of administration and the duration of treatment. There was no external validation for the

diagnosis. Prescription pads were supposed to be returned to the research team once they are full.

III. Source of data collection

The secondary data which was collected by the project incharge Dr. Vishal Diwan about the antibiotics prescribed by the informal providers for various diseases treated by them was used.

2.1.3 Data Process and Analysis

Analysis was carried out using SPSS software version 18.0 (SPSS, Inc., Chicago, IL) (2010d). Patients were given a special code, to filter the duplicated patients whenever needed. Age of the patients were recoded into age groups (0-5 years, 6-15 years, 16-45 years, more than 45 years). Drugs were recoded into pharmacological groups [according to the WHO, Anatomical Therapeutic Chemical Classification System (ATC)] and recommended doses into correct dose, substandard (under-dose) and overdose. Illnesses treated were classified into new variable infectious (antibiotic plausible) and non infectious (where antibiotic treatment is not required). Frequency distributions of all variables were calculated and factors that could influence the treatment by informal health care providers were compared in terms of proportions. Tests of significance were done using chi-square to detect statistical significance.

2.1.4 Background Characteristics

Table 2.1: Characteristics of informal Health care providers in 12 villages of Ujjain districts

S.No.	Characteristic	Percentage of respondents (n=12)
1.	Age group (in years)	
	25-30	20.6
	31-35	21.9
	>35	57.5
2.	Sex	
	Male	100
3.	Medical qualification	
	CHV	58.3
	CHV and RMP	16.6
	DHMS	1.8
	VHW	12.2
	Compounder	4.3
	Patent medicine vendor	6.8
4.	Years of experience	
	0-10	33.7
	11-15	26.7
	16-20	39.5

Table 2.2: Characteristic of patients treated by the informal Health care providers in 12 villages of Ujjain districts

S.No.	Characteristics	Percentage of patients (n=2054)
1.	Age group (in years)	
	0 to 5	11.6
	6 to 15	13.4
	16 to 45	45.9
	>45	27.5
	Not mentioned in prescription	1.7

Table 2.3: Characteristics of illnesses treated by the informal health care providers in 12 villages of Ujjain districts

S.No.	Characteristics	Percentage of illness treated (n= 2089)
1.	Illnesses treated and categorized according to body system	
	Musculoskeletal	4.8
	Immune system	1.1
	Blood and Lymphatic	0.2
	Cardio-respiratory	32.8
	Genito-urinary	2
	Gastrointestinal	18.3
	Central nervous system	0.1
	General, Oral, ENT,	35.9
	Ophthalmic, Skin	
	Injuries	3.4

2.	Category of illnesses	
	Infectious (antibiotic plausible)	65.9
	Non infectious	32.6
	Insufficient data	1.5

Table 2.4: Characteristic of Antibiotics prescribed by informal health care providers in 12 villages of Ujjain districts

S.No.	Characteristics	Percentage of prescriptions (n=2089)
1.	Antibiotics prescribed	
	Yes	73.1
	No	26.8
2.	Number of antibiotics prescribed	
	One	47
	More than one	26.1
	No antibiotics	26.8
3.	Antibiotics prescribed	
	Amikacin	3.9
	Amoxicillin	7.6
	Ampicillin	5
	Azithromycin	0.9
	Cefadroxil	2.7
	Cefixime	3.8
	Cefotaxime	10.1
	Cefpodoxime	0.3
	Ceftriaxone	4
	Cephalexin	0.1

	Cephalosporin	0.1
	Ciprofloxacin	14.4
	Doxycycline	2.4
	Erythromycin	0.4
	Ethambutol	0.4
	Furazolidone	0.1
	Gatifloxacin	1.1
	Gentamicin	0.1
	Isoniazide	13.7
	Levofloxacin	0.1
	Metronidazole	0.7
	Norfloxacin	4.3
	Ofloxacin	2.5
	Ornidazole	13.5
	Roxithromycin	0.9
	Streptomycin	0.3
	Trimethoprim	0.1
	Sulfamethoxazole	5
	Tetracycline	0.9
	And	
4.	Antibiotic groups	
	Amino glycosides	17.6
	Cephalosporin 1st Generation	2.8
	Cephalosporin 3rd Generation	18
	Macrolides	1.7
	Nitro furans	1.1
	Penicillin	12.2
	Penicillin Combination	0.3
	Quinolones/Fluoroquinolones	27.3
	Sulfonamides	5
	Tetracycline	2.4
	Drugs Against Mycobacterium	0.1
	Others	4.4
	Quinolones And Antiprotozoal	3.9

	Combination Cephalosporin And Quinolones Combination Missing (Antibiotics not prescribed)	0.3 26.8
		For following (n=2035)
5.	Route of antibiotic administration Oral Intra muscular Intra venous Local application Not mention	62.5 31.9 1 0.7 3.7
6.	Recommended doses (according to the World Health Organization, Anatomic Therapeutic Chemical classification with defined daily dose (ATC/ DDD) Correct dose Substandard dose(under dose) Over dose Insufficient data	39.2 40.8 16.4 36.9

Table 2.5: Association between the Antibiotic prescribed and the characteristics of informal health care providers and treatment pattern of informal health care providers

S.No.	Characteristics	Percentage of antibiotics received (n=2089) Yes	Chi square test (p value)
1.	Age group (in years) 25-30 31-35 >35	 67.2(Total=430) 78.6(Total=458) 73.3(Total=1201)	 p < .01
2.	Medical qualification of informal health care provider CHV CHV and RMP DHMS VHW Compounder Patent medicine vendor	 77.8 (Total=1218) 60.5 (Total=347) 60.5 (Total=38) 74.8 (Total=254) 55.05 (Total=89) 76.2 (Total=143)	 p < .01
3.	Years of experience 0-10 11-15 16-20	 70.8 (Total=705) 84.2 (Total=558) 67.8 (Total=826)	 p < .01
4.	Age (in years) of Patient 0 to 5 6 to 15 16 to 45 >45	 83.1 (Total=242) 80.6 (Total=279) 69.6 (Total=958) 71.6 (Total=574)	 p < .01

5	Antibiotic prescribed		
	Infectious (antibiotic plausible)	81 (Total=1376)	p < .01
	Non infectious	58 (Total=682)	
	Insufficient data	58 (Total=31)	

Statistic used: Chi Square

Statistically significant:

* p-value < 0.1 (shows 90 percent significant association between the variable and visit for antenatal check up.

**p-value < 0.05 (shows 95 percent significant association between the variable and visit for antenatal check up

***p-value < 0.01 (shows 99.9 percent significant association between the variable and visit for antenatal check up

3.1 Results

3.1.1 Characteristics of informal Health care providers in 12 villages of Ujjain districts:

A total of 18 IHCPs returned the prescription pads, provided to them during the study. Among 18 IHCP, majority were the CHV (12). All the health workers were male. All were above 25 years of age and were literate having received at least primary education. 40% of the IHCPs were having more than 15 years of work experience.

3.1.2 Characteristic of patients and the illnesses treated by the informal Health care providers:

Patient age was recoded into four age groups. 46% of the patients treated were in the middle age group (16 to 45). Children treated were 11.6%. The common illnesses seen were Cardiorespiratory (cough and cold, asthma etc.) which was 33% followed by general illnesses such as fever, headache, body ache, etc.

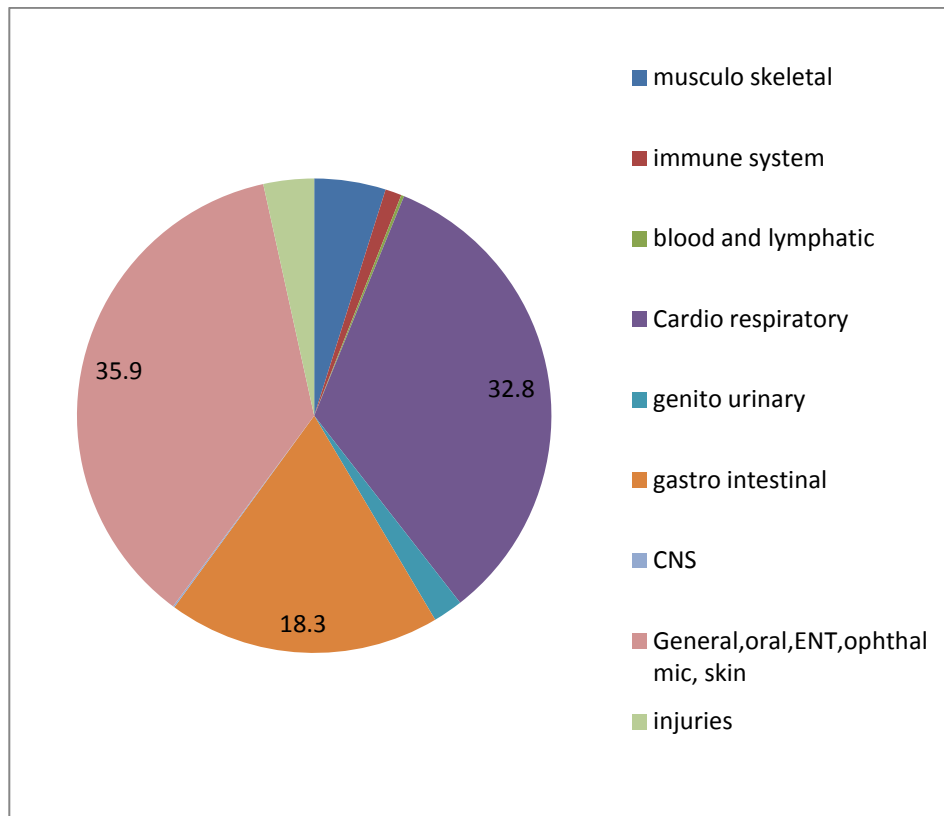


Fig3.1: Percentage of illnesses treated and categorized according to body system

Illnesses treated were further classified into the infectious (antibiotic plausible) and non infectious where antibiotic treatment was not mandatory. 66% of them were infectious and 33% illnesses reported were found to be non infectious. Among the illnesses found to be non infectious, 58% were prescribed antibiotics

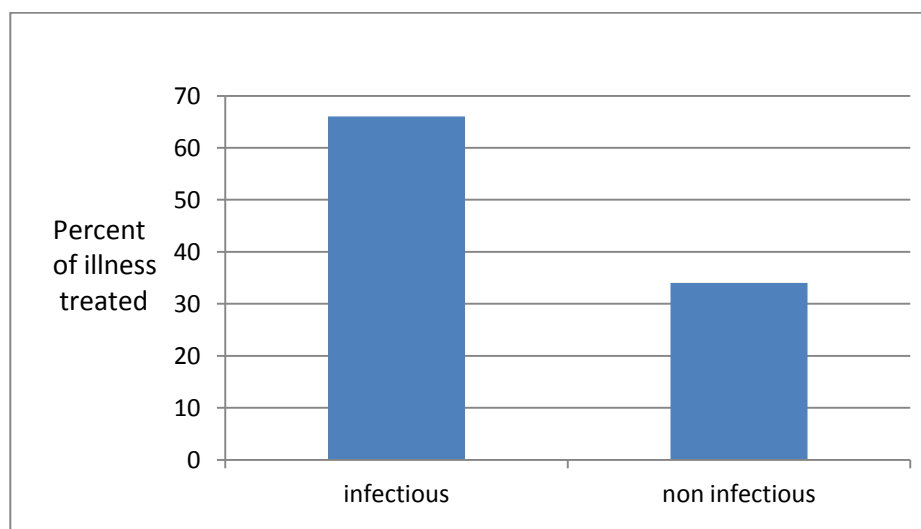


Fig 3.2: Categorization of illnesses treated into infectious (antibiotic plausible) and non infectious

3.1.3 Characteristic of Antibiotics prescribed by informal health care providers

Among the 2089 prescription studied, 73% received some kind of antibiotic and out of them 26% received more than one antibiotic. 28 types of antibiotics were prescribed by the providers to treat various illnesses. Ciprofloxacin was most frequently prescribed antibiotic (14.4). Oral was the most common route of administration of drug (63%), followed by intra muscular (32%). Doses of the antibiotics prescribed were found to sub standard (41%).

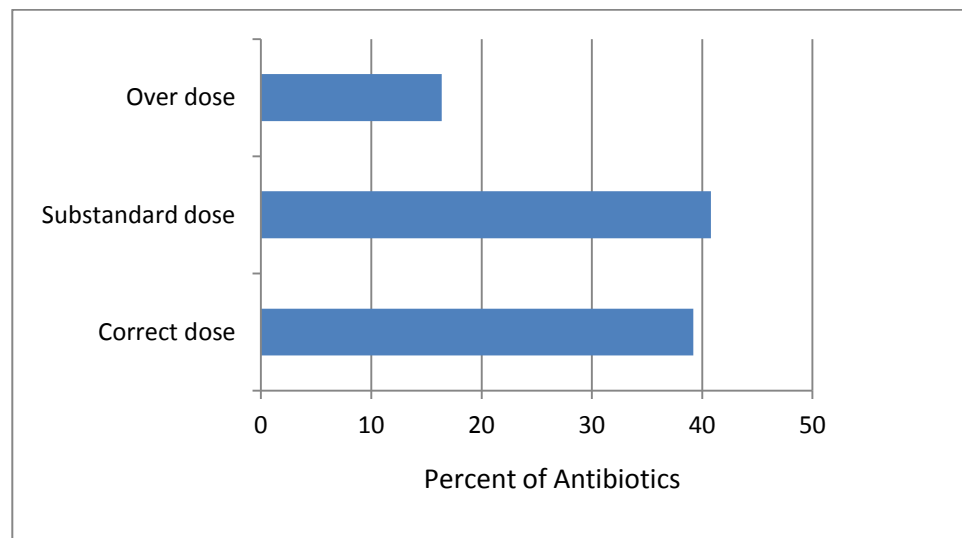


Fig 3.3: Characteristics of doses prescribed by informal providers

4.1 Discussion

The aim of this study was to describe the characteristics of the informal health care providers and their patients, which have a potential to influence their antibiotic prescription. Other objective of the study was to give general description of the antibiotics prescribed. To our knowledge there is no such study has been conducted for an in-depth investigation on the role of the informal health care providers in health care provision with regard to antibiotic prescription, at least in Madhya Pradesh.

Informal care providers mean age in this study was higher than that identified in other studies in Bihar and Chakaria (Mahmood et al., 2010, Sarbani. et al., 2000). Providers older than 35years were prescribing more numbers of antibiotics (P value<0.01) compared to the younger than 35 years as showed in this study. However from different point of view, those providers were the most experienced with regard to

years of practice. It is clear that the experience without relevant education is not consequential for better practice.

4.1.1 Rational drug use

There are growing urges in public health regarding the relevance of antibiotics prescription for common illness, because 75% of these prescriptions were “questionable” (Wise et al., 1998). Results of this study support such argument because 42.2% of the patients were receiving antibiotics without apparent indication. The rest were given antibiotics without scientific evidence and lab confirmation. It is well known that the national list of essential medicines is developed to provide guidance for rational drug use in the country and to ensure that medicines in the list are cost-effective, relevant and safe (India, 2003, Hogerzeil, 2004). Out of the antibiotics prescribed in this study about 11% were drugs not in India’s list of essential medicines and 20% were antibiotics to be taken under supervision in secondary or tertiary health facilities.

With regard to HIV/AIDS, India has the second highest absolute burden of the disease (Mignone et al., 2007), and almost the largest number of infected people (Quinn, 1996). Unsafe injections are recognized means for transmitting blood borne infections especially HIV and hepatitis “B& C” (WHO, 2009c, S. El Katsha, 2006, Kermode. and Muani., 2006). The level of the awareness of the informal health care providers’ about the safety measures in using and disposing the syringes is not clear. This raise worries because more than thirty percent of their patients received antibiotics in forms of IM injections.

Seventy three percent of the patients received antibiotics. Ciprofloxacin was the most frequent antibiotic prescribed by the informal care providers in this study (14.4%). And also 41% of the antibiotics prescribed were of sub- standard doses (according to the World Health Organization, Anatomic Therapeutic Chemical classification with defined daily dose (ATC/DDD). There are needs for studies at the community levels to detect variations in the antibiotics use and resistance in order to propose contextualized interventions as recommended by WHO (WHO, 2001, Levy, 1998b). Acute respiratory infections and its treatments are known to be the gate for development of antibiotics resistance. Although most of these infections do not require treatment and are self limited yet they are the main drivers for health seeking

(Levy, 1998b). In addition, health seeking behaviour of patients and their demands for antibiotics is a well known pressure factor to the providers to prescribe more unnecessary antibiotics (S KI, 2008, Nyazema et al., 2007, Wise et al., 1998). Such studies will contribute to the knowledge detected association between antibiotics used and resistance developed (R. et al., 2005, S KI, 2008, Fochsen et al., 2006, Seema. et al., 2003, De Costa et al., 2008a, Sun et al., 2009, Kumar et al., 2008, Siddiqi et al., 2002).

4.1.2 Informal health care providers:

People believe in the informal health care providers because they give them services modified to their needs, they charge between 5- 25 Indian Rupees, compared to for-profit services which charge 30-50 Indian Rupees or more (1=0.02USD). In addition to that they accept whatever means of payment and they are available in convenient times (Gidwani, Radwan, 2005, De Costa et al., 2008b). Those factors led to establish reliance on them (Gidwani, S. El Katsha, 2006). Informal health care providers and the work they do is perceived to be harmful (Cross. and MacGregor., 2009) and this perception is confirmed by this study, however ignoring them will deepen the problem of disease burden and irrationality of drug use. This is one of the main challenges policy makers need to acknowledge for advancing health system regulations, management and outcome (Cross. and MacGregor., 2009, S. El Katsha, 2006, Banerjee. et al., 2003, Consortium, 2008, Gupta and Rani, 2004).

Informal health care providers have qualities that worth rethinking the means to absorb them into the health system. They could be trained to detect and treat sexually transmitted infections (STIs) or diarrheal diseases (Mignone et al., 2007). Trainings that directed to change their knowledge, subsequently will improve their practice (Seema. et al., 2003, Sarbani. et al., 2000). Many lessons could be obtained from the experience of the barefoot doctors in China. They were trained for minimum of 3 months and assigned to specific task such as home visits, health education, epidemic controls and some administrative work (YOU-LONG. and LI-MIN., 1982). In addition, the concept of “task shifting” which was introduced by WHO to overcome shortage in staff to fight HIV/AIDS epidemic, this concept could be expanded to include curative and preventive primary health care (WHO, 2007, Lehmann et al., 2009)

5.1 Limitations of Study:

Some methodological considerations have emerged, based on the results:

- The symptoms reported by the informal providers were too scattered to be analyzed. To analyze the reported symptoms they were classified differently (as per body system, or based on the clinical sense) which was not as reported by the providers, because interpretation of what they reported was not feasible.
- The research team did not observe informal health care providers full time. This was the first study in the area and the aim was to make them feel comfortable to continue their routine practice; however that made much of valuable information being ambiguous such as:
 - How do they reach the diagnosis of the disease?
 - Did the providers record the antibiotics in the prescription pads when they dispense it themselves?
 - Did they apply any kind of safety measure with when administering and disposing the syringes for injectable antibiotics they prescribed, did they use a new one every time and did they dispense the syringes or patients brought them.

6.1 Conclusion

The informal Health care providers involved in this study were all males with mean age of 36 years, and their education varied from high school to post graduate beside four different forms of no accredited medical qualifications. Symptoms that constituted the higher burden were the ones related to respiratory system. Many diseases were diagnosed without lab confirmation and treated by antibiotics; both diagnosis and treatment were not following the national guidelines. They risked lives of their patients by giving medicines that should be taken under close supervision in secondary or tertiary level hospitals. One third of the antibiotics prescribed were in forms of injections which carries a great threat for transmitting blood borne infections. In addition, the informal providers dispensed medicines that were of unknown source or storage conditions.

The medical knowledge of the informal providers was striking. However designing of a health policy for a country like India requires flexibility as addressed by the national health policy. The challenges of health system regulation and management, shortfall of human resources for health in addition to the high burden of diseases are of great concern.

Strengthening health system and enforcing regulations are not necessarily through illegalizing the informal health care providers, particularly when training could improve their practice. Decision makers need to perceive that ignoring informal health care providers will not enable them to cover the gaps in human resource promptly. Moreover, they will continue working “ineffectively”. Not all the patients need to be seen by a doctor and not all patients survive until they have access to a doctor this was the broad concept behind the task shifting to cover gaps in human resource for health as WHO addressed. Informal health care providers could assist in decongesting the overwhelmed health system. To achieve that, extensive collaborated efforts are needed for spotting informal health care providers, training them for specific health care responsibilities, and elucidating their position in the health system.

This study has generated new findings and provided grounds for many of the concerns about the informal health care providers and the work they do. However this study is an initial step to explore the complex interactions of informal health care providers and the health system in India. Many aspects of these interactions remain to be studied to provide solid grounds for the policymakers to develop potent intervention for better health outcomes.

7.1 Recommendations

Based on the finding of this study the following is recommended for the future studies:

- Consideration to include actual or proportional representation from the different categories of providers and their patient’s characteristics.
- To distribute a laminated check list of the symptoms based on the International Classification of Diseases (ICD), to avoid the wide variation and misinterpretation of the reported symptoms and to make it possible to analyze.

- To add a qualitative part in the study design and to have in-depth interviews to highlight the perception of the informal providers towards diagnosis of the diseases and their choices of prescribing the appropriate medication.
- To ask the informal providers to give prescription for all the patients present to them. That will give better reflection for the percentage of patients who did receive antibiotics compared to the total number of patients.
- Having an observer all the time, could alter the behavior of the prescriber. However the research team need to stay with the providers while working for many reasons such as:
 - 1- To observe how providers reach the diagnosis of the diseases.
 - 2- To make sure that the care providers use the prescription pad with all the patients they see.
 - 3- To make sure that the providers write all the medicines whether they dispense those medicines themselves or patients will obtain them from somewhere else.
 - 4- To observe if the provider follow the universal precautions measures especially with regard to injections.

Informal providers in general are under investigated. This study opens the door widely for pursuing further studies regarding many aspects that emerged from this study, such as impact analysis of the economic and physical burden of diseases and antibiotics resistance in rural areas, the cost-effectiveness analysis of absorbing the informal health care providers into the health system compared to incentivizing qualified staff to work in the rural areas. As well as evaluation of the current health system in India and conducting qualitative studies to compare the health seeking behavior in two different settings, one served by qualified care providers and the others served by informal health care providers.

8.1 Bibliography

1. 2010a. Antibiotic prescribing in outpatients: hospital and seasonal variations. Ujjain.
2. 2010b. *ATC/DDD Index* [Online]. WHO Collaborating Centre for Drug Statistics Methodology and Norwegian Institute of Public Health. Available: http://www.whocc.no/atc_ddd_index/ [Accessed 28 July 2010].
3. AYESHA DE, C. & VINOD, D. 2007. 'Where is the public health sector?': Public and private sector healthcare provision in Madhya Pradesh, India. *Health policy (Amsterdam, Netherlands)*, 84, 269-276.
4. BERMAN, P. A. 1998. Rethinking health care systems: Private health care provision in India. *World Development*, 26, 1463-1479.
5. DESHPANDE., K., SHANKAR., R., DIWAN., V., LÖNNROTH., K., MAHADIK., V. K. & CHANDORKAR., R. K. 2004. Spatial pattern of private health care provision in Ujjain, India: a provider survey processed and analysed with a Geographical Information System. *Health policy (Amsterdam, Netherlands)*, 68, 211-222.
6. DIWAN, V., TAMHANKAR, A., KHANDAL, R., SEN, S., AGGARWAL, M., MAROTHI, Y., IYER, R., SUNDBLAD TONDESKI, K. & STALSBY LUNDBORG, C. 2010. Antibiotics and antibiotic-resistant bacteria in waters associated with a hospital in Ujjain, India. *BMC Public Health*, 10, 414.
7. MASUD., A. S. 2009. Informal sector providers in Bangladesh: how equipped are they to provide rational health care? *Health Policy Plan.*, czp037.
8. PETERS, D. H. & MURALEEDHARAN, V. R. 2008. Regulating India's health services: To what end? What future? *Social Science & Medicine*, 66, 2133-2144.
9. SEEMA., A., ZULFIA., K. & ALI., A. 2003. Knowledge of diarrhea management among rural practitioners. *Indian Journal of Pediatrics*, 70, 217-219.
10. SIDDIQI, S., HAMID, S., RAFIQUE, G., CHAUDHRY, S. A., ALI, N., SHAHAB, S. & SAUERBORN, R. 2002. Prescription practices of public and private health care providers in Attock District of Pakistan. *The International Journal of Health Planning and Management*, 17, 23-40.
11. SYED MASUD, A. & MD. AWLAD, H. 2007. Knowledge and practice of unqualified and semi-qualified allopathic providers in rural Bangladesh:

- Implications for the HRH problem. *Health policy (Amsterdam, Netherlands)*, 84, 332-343.
12. TENOVER, F. C. & MCGOWAN, J. E. J. 1996. Reasons for the Emergence of Antibiotic Resistance. *The American Journal of the Medical Sciences*, 311, 9-16.
 13. WHO 1987. The rational use of drugs. *Conference of Experts*
 14. Nairobi: World Health Organization.
 15. WHO 2001. WHO Global Strategy for Containment of Antimicrobial Resistance
 16. WHO. 2009a. *Essential medicines* [Online]. Available: http://www.who.int/medicines/services/essmedicines_def/en/index.html [Accessed 3 August 2010].
 17. WILLIAMS, R. J. & RYAN, M. J. 1998. Surveillance of antimicrobial resistance---an international perspective. *BMJ*, 317, 651-660.

9.1.1 ATC Code and DDD of Antibiotics prescribed by the informal health care providers

S.No.	Antibiotic Name	ATC Code	DDD	Unit	Route of Administration	Use
1.	Amikacin	D06AX12			Topical	Antibiotics for topical use
		J01GB06	1	g	P	Antibacterial for systemic use
		S01AA21				Antibiotics for infections
2.	Gentamicin	D06AX07			Topical	Antibiotics for topical use
		J01GB03	0.24	g	P	Antibacterial for systemic use
		S01AA11				Antibiotics for infections
		S02AA14				Anti infective, sensory organs, otological preparations
		S03AA06				Anti infective, sensory organs, ophthalmological and otological preparations

3.	Cefadroxil	J01DB05	2	g	O	Anti-infective for systemic use, Antibacterial for systemic use, Other b-lactam antibacterials, 1 st generation cephalosporin
4.	Cefalexin	J01DB01	2	g	O	Anti-infective for systemic use, Antibacterial for systemic use, Other b-lactam antibacterials, 1 st generation cephalosporin
5.	Cefixime	J01DD08	0.4	g	O	Anti-infective for systemic use, Antibacterial for systemic use, Other b-lactam antibacterials, 3 rd generation cephalosporin
6.	Cefotaxime	J01DD01	4	g	P	Anti-infective for systemic use, Antibacterial for systemic use, Other b-lactam antibacterials, 3 rd generation cephalosporin
7.	Cefpodoxime	J01DD13	0.4	g	O	Anti-infective

						for systemic use, Antibacterial for systemic use, Other b-lactam antibacterials, 3 rd generation cephalosporin
8.	Ceftriaxone	J01DD04	2	g	P	Anti-infective for systemic use, Antibacterial for systemic use, Other b-lactam antibacterials, 3 rd generation cephalosporin
9.	Erythromycin	D10AF02			Topical	Anti-infective for treatment of acne
		J01FA01	1	g	O	Anti-infective for systemic use, antibacterials for systemic use, macrolides
			2	g	O (erythro mycin ethylsuc cinate tablet)	
			1	g	P	
		S01AA17				Anti-infective, antibiotics, Sensory organ and ophthalmologica l preparations.
10.	Azithromycin	J01FA10	0.5	g	P	Anti-infective

			0.3	g	O	for systemic use, antibacterials for systemic use, macrolides
		S01AA26				Anti-infective, antibiotics, Sensory organ and ophthalmologica l preparations.
11.	Roxithromycin	J01FA06	0.3	g	O	Anti-infective for systemic use, antibacterials for systemic use, macrolides
12.	Amoxicillin	J01CA04	1	g	O	Anti-infective and antibacterial for systemic use
			1	g	P	
13.	Ampicillin	J01CA01	2	g	O	Anti-infective and antibacterial for systemic use
			2	g	P	
			2	g	R	
		S01AA19				Anti-infective, antibiotics, Sensory organ and ophthalmologica l preparations.
14.	Oxacillin	J01CF04	2	g	O	Anti-infective and antibacterial for systemic use
			2	g	P	
15.	Amoxicillin and Clavulanic acid	J01CR02	1	g	O	Anti-infective and antibacterial for systemic use
			3	g	P	

16.	Ciprofloxacin	J01MA02	1	g	O	Anti-infective and antibacterial for systemic use
			0.5	g	P	
		S01AE03				Anti-infective, Sensory organ and ophthalmological preparations.
		S02AA15				Anti infective, sensory organs, otological preparations
		S03AA07				Anti-infective, sensory organs, ophthalmological and otological preparations
17.	Gatifloxacin	J01MA16	0.4	g	O	Anti-infective and antibacterial for systemic use
			0.4	g	P	
		S01AE06				Anti-infective, Sensory organ and ophthalmological preparations.
18.	Ofloxacin	J01MA01	0.4	g	O	Anti-infective and antibacterial for systemic use
			0.4	g	P	
		S01AE01				Anti-infective, Sensory organ and ophthalmological

						I preparations.
		S02AA16				Anti infective, sensory organs, otological preparations
19.	Norfloxacin	J01MA06	0.8	g	O	Anti-infective and antibacterial for systemic use
		S01AE02				Anti-infective, Sensory organ and ophthalmologica l preparations.
20.	Levofloxacin	J01MA12	0.5	g	O	Anti-infective and antibacterial for systemic use
			0.5	g	P	
		S01AE05				Anti-infective, Sensory organ and ophthalmologica l preparations
21.	Sulfamethoxazole and trimethoprim	J01EE01				Anti-infective and antibacterial for systemic use
22.	Doxycycline	A01AB22				Anti-infective and antiseptics for local oral treatment
		J01AA02	0.1	g	O	Anti-infective and antibacterial for systemic use
			0.1	g	P	
23.	Oxytetracycline	D06AA03			Topical	Antibiotic for

						dermatological use
		G01AA07				Gynecological anti-infective and antiseptic
		J01AA06				Anti-infective and antibacterial for systemic use
		S01AA04				Anti-infective, Sensory organ and ophthalmological preparations
24.	Tetracycline	A01AB13				Anti-infective and antiseptics for local oral treatment
		D06AA04				Antibiotic for dermatological use
		J01AA07	1	g	O	Anti-infective and antibacterial for systemic use
			1	g	P	
		S01AA09				Anti-infective, Sensory organ and ophthalmological preparations
		S02AA08				Anti infective, sensory organs, otological

						preparations
		S03AA02				Anti-infective, sensory organs, ophthalmological and otological preparations
25.	Drugs against Mycobacteria					
	Ethambutol	J04AK02	1.2	g	O	Drugs for treatment of tuberculosis
			1.2	g	P	
	Isoniazide	J04AC01	0.3	g	O	Drugs for treatment of tuberculosis
			0.3	g	P	
	Streptomycin	A07AA04				Antidiarrheals, intestinal anti-inflammatory/anti-infective agents
		J01GA01	1	g	P	Anti-infective and antibacterial for systemic use
26.	Others					
	Metronidazole	A01AB17				Anti-infective and antiseptics for local oral treatment
		D06BX01				Antibiotic and chemotherapeutic for dermatological use
		G01AF01				Gynecological anti-infective

						and antiseptics
		J01XD01	1.5	g	P	Anti-infective and antibacterial for systemic use
		P01AB01				Agents against amoebiasis and other protozoal diseases
	Tinidazole	J01XD02	1.5	g	P	Anti-infective and antibacterial for systemic use
		P01AB02	2	g	O	Agents against amoebiasis and other protozoal diseases
			2	g	R	other protozoal diseases
	Ornidazole	G01AF06				Gynecological anti-infective and antiseptics
		J01XD03	1	g	P	Anti-infective and antibacterial for systemic use
		P01AB03	1.5	g	O	Agents against amoebiasis and other protozoal diseases
	27.	Quinolones and Antiprotozoal combination				
	Ofloxacin-ornidazole	J01RA05				Anti-infective and antibacterial for systemic use
	Ciprofloxacin - tinidazole					
	Norfloxacin-tinidazole					
28.	Cephalosporins and quinolones combinations					

	Cefixime and ofloxacin					
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