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Full Length Research Paper

Medicines prescribing pattern in northern Ghana: does it comply with WHO recommendations for prescribing indicators?

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The prescribing of medicines is critical in the treatment of diseases in general practice. Inappropriate prescribing can negatively influence the goals of treatment, which makes the assessment of the patterns of prescriptions essential. The objective of this study was to assess the medicines prescribing pattern in health facilities in the Northern Ghana, a developing economy in Africa, using the prescribing indicators recommended by the WHO and International Network of Rational Use of Drugs (WHO/INRUD). A prospective observational survey was used to collect data from 600 prescriptions between February and July of 2017 using a specially designed check list. Fifty randomly selected prescriptions each were collected from 12 facilities within the metropolis. Participating facilities were included in the study by systematic sampling that was purposive, convenience and random. Data was analysed in Statistical Package for Social Science (SPSS) version 18. The average number of medicines prescribed was (3.9). Antibiotics and injections were prescribed at a rate of 55 and 14%, respectively; while prescribing by generic name was 53%. Prescribing from the Essential Medicines List (EML) stood at 96%. Public facilities had better indicators compared with private: average number of drugs (3.5 vs 4.3, $p < 0.001$); percentage injections (13 vs 25, $p = 0.002$); percentage generic names (62 vs 45, $p = 0.003$). Percentage antibiotics (54 vs 56) and percentage from the EML (97 vs 94) were not different for public and private facilities. There is inappropriate prescription pattern of medicines, such as polypharmacy and over prescribing of antibiotics and injections. Prescribing by generic name although high was still lower than recommended.

Key words: Patterns prescription, medicines, indicators, adherence, overprescribing.

INTRODUCTION

Medicines are vital in healthcare delivery but for most people in the world, medicines are still unavailable, unaffordable, and unsafe (Ofori-Asenso and Agyeman, 2016; Oguanobi, 2018). It is estimated that around 50%

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of all medicines are prescribed, dispensed or sold and used inappropriately (WHO, 2002). Inappropriate and irrational use of medicines is wasteful and harmful to both the individual and the population at large. Adverse events following the inappropriate use of medicines are significant cause of morbidity and mortality (Assiri et al., 2016). It has been reported that 5 to 6% of inpatient admissions in the United States of America (USA) are drug related of which adverse drug events (ADEs) alone account for 10% (Krahenbuhl-Melcher et al., 2007).

It is estimated that, as high as 25 to 70% of the entire health budgets of developing countries are spent on medicines, despite the limited budgetary allocations to health in these countries, whereas, about 10% of health expenditure in the developed economies is spent on medicines (Dielman, 2017). Inappropriate prescribing and use of antimicrobial agents have led to a swift increase in antibiotic resistance globally, leading to increased significant morbidity and mortality (Li and Webster, 2018). Studies indicate that, the cost of antibiotic resistance per annum is in the range of US$4-5 billion in the USA and $1.01billion in Europe (Washington, 1998; EU, 2017).

In Africa, the excessive use of antibiotics and injections are particularly more problematic in private than public health facilities (Ofori-Asenso and Agyeman, 2015). The indiscriminate use of antibiotics for the treatment of upper respiratory tract infection has been found to be in ascendency in Ghana (Ahiabu et al., 2015). This inevitably is a major source of financial drain to the already overburden National Health Insurance Scheme and more importantly, the reported antibiotic resistance in the country (Ahiabu et al., 2015).

The World Health Organisation (WHO) defines rational use of medicines as: 'patients receiving medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period, and at the lowest cost to them and their community' (WHO, 2001). Unrestricted access to and irrational use of medicines is abundant in many developing countries (Siddiq et al., 2002). The selection and rational use of medicines are accepted as key principles of health service quality management in both the public and private sectors (IRUM/GHS, 2008). This study attempted to measure the performance of health facilities in the Tamale Metropolis against the WHO/INRUD medicine prescribing indicators as a bench mark.

MATERIALS AND METHODS

Study area and site

The study was conducted in the Tamale Metropolis, which is one of the 26 administrative and political District Assemblies in Northern Region of Ghana. The metropolis has a total population of 223,252 comprising of 112,143 (50.2%) females according to the 2010 population and housing census by the Ghana Statistical Service. With 80.8% of the population living in urban areas, the average life expectancy is estimated at 63.4 years (World Life Expectancy, 2018) and a per capita GDP of 1708 (Trading Economics, 2018).

The metropolis has 28 health service facilities and one teaching hospital, the Tamale Teaching Hospital (TTH). The study included the only tertiary health facility, three secondary and 8 primary health facilities in the metropolis. The tertiary health facility was the TTH, which has a bed capacity of 450 and sees over 100, 000 patients a year. It provides all specialist care services to patients referred from other facilities lower facilities in the northern sector of Ghana. It also serves as an institution for training in health related professions.

The secondary health facilities were the Tamale West Hospital (TWH), Tamale Central Hospital (TCH) and the Seventh Day Adventist Hospital (SDAH). With bed capacities of 185, 126 and 100 each, these facilities provide reproductive and child health, laboratory, and pharmaceutical care services to outpatients and inpatients within the Tamale metropolis and beyond. They are manned by medical officers and physician assistants who generate prescriptions. The primary health facilities were five private health facilities and three sub district facilities, which offer general Outpatient Department (OPD) services. Prescribers in these facilities are mostly physician assistances, nurses and midwifes. Public facilities are those that are owned by the government and work to serve the general population, while private health facilities are owned by corporate entities and are driven by profits.

Study design, population and sampling

In a prospective observational survey, a total of 600 outpatient prescriptions issued at the selected health facilities between February and July, 2017, were collected as recommended by the WHO (1993). In a systematic manner, 12 health facilities were purposefully selected, to ensure the inclusion of all the categories of health facilities in terms of services provided and ownership. To this end, all facilities in the metropolis were stratified into four as: tertiary, secondary, primary, and also public or private health facilities. From the 12 facilities 50 prescriptions were randomly selected using a computer generated set of random numbers to reach the 600 prescriptions. The prescriptions were collected at the OPD of the selected facilities till the targeted number was reached in each facility.

Data collection

This was a prescription survey, in which data was collected using a specially designed check list by three trained research assistants. For each prescription issued at the OPD, the WHO/INRUD core prescribing indicators and the ownership of the facility such as private or public were captured. On the day of the research, the research assistants extracted the study information after the dispenser had completed dispensing at the OPD pharmacy or dispensary. The specific data required to measure the prescribing indicators were recorded for each patient encounter and entered directly into an ordinary prescribing indicator form.

Prescribing indicators

The World Health Organization/International Network for Rational Use of Drugs (WHO/INRUD) has set standard prescription indicators that guide the prescribing of medicines (WHO, 1993). The prescribing indicators used in this study were adapted and pretested versions of those recommended by the WHO (1993), and described as follows:

(1) Average number of drugs prescribed per encounter: was calculated by dividing the total number of different drug products prescribed, by the number of encounters surveyed. Fixed dose

Table 1. WHO recommended prescribing indicators assessed in the Tamale Metropolis (N =600 prescriptions).

Prescribing Indicator	Average/ Percentage	SD/ Limits	WHO reference (WHO,1993)
Number of drugs	3.9	0.83	< 2
Antibiotic	54.8	13.3	<30
Injection	14 ‡	0 – 60 ‡	<20
Generic name	53.2	16.8	100
From EML	95.7	4.10	100

‡: is the median values.

Table 2. Prescribing indicators compared between public and private facilities.

Indicator	Public	Private	*P*	Statistics Tech
Average number of drugs (SD)	3.5 (1.22)	4.3 (0.68)	< 0.001	Ind. Stud, t-test
Percentage antibiotic	53.7	56.0	0.330	Chi-square
Percentage injections	13.0	25.0	0.002	Chi-square
Percentage with generic name	61.7	44.8	0.003	Chi-square
Percentage from EML	97.0	93.7	0.053	Chi-square

EML: essential medicines list.

combined drugs prescribed for one health problem was counted as one. This indicator was used to measure the degree of polypharmacy

(2) Percentage of drugs prescribed by generic name: - calculated by dividing the number of drugs prescribed using generic name by the total number of drugs prescribed, multiplied by 100.

(3) Percentage of encounters with an antibiotic: - obtained by dividing the number of patient encounters in which an antibiotic was prescribed by the total number of encounters surveyed, multiplied by 100.

(4) Percentage of encounters with an injection: - calculated by dividing the number of patient encounters in which an injection was prescribed by the total number of encounters surveyed, multiplied by 100.

(5) Percentage of drugs prescribed from the essential drug list:- calculated by dividing number of drugs prescribed which are in the essential drug list by the total number of drugs prescribed, and multiplied by 100.

Data analysis

Data collected was double entered and verified using the software Epi Info (version 3.5.1 (CDC, Atlanta, Georgia USA), which was designed to include range checks. The data was exported to SPSS (version 18; SPSS Inc., Chicago, Illinois, USA) for analysis. The unpaired t-test was used to compare means for continuous variables and the Chi-square test for differences in proportions for categorical variables. A P-value of <0.05 was considered statistically significant. Generic prescribing and EDL drugs were analysed using recent pharmacological textbooks, the Ghana national standard treatment guidelines and the Ghana Essential Medicine List (EDL).

RESULTS

The prescribing indicators measured on the 600 individual prescriptions gathered from all the facilities are summarised in Table 1. The comparison of how the indicators performed between public and private health farcicalities is presented in Table 2.

Average number of drugs per encounter

The overall average (standard deviation) number of drugs per encounter in all twelve health facilities (HFs) surveyed was 3.9 (0.83). Among the individual HFs, the highest average number of drugs prescribed was observed in a private clinic with an average (standard deviation) of 5.8 (1.20) drugs per encounter, whereas the least average of 2.9 (1.00) was observed in a public health centre. Comparing the averages of the public and private facility prescriptions indicated that, the average number of medicines in the private health facilities (4.3) was more and significantly different from that prescribed in the public health facilities (3.5), P < 0.001 (Table 2).

Percentage encounter with an antibiotic prescribed

The mean (sd) percentage encounter with antibiotic prescribed in the HFs in the metropolis was found to be 54.8% (13.30). The least (34%) was observed in a private health facility whereas the highest (78%) was observed in a public facility. The results indicate that both public and private facilities had high utilization of antibiotics; 56 and 54% respectively, and there were no significant difference in the proportions between public and private facilities (P = 0.330).

Percentage of injections prescribed

The overall median injection prescribed in the facilities within the metropolis was 14%. Over 50% of the health facilities had injections prescribed at above 10%. The highest percentage injection prescribed was 60%, with only one facility recording no injection prescribed. A chi-square analysis returned a significant difference between percentage of injections between public and private health facilities. The public health facilities had a significantly lower proportion of 13% compared to the 25% in the private facilities ($P < 0.001$).

Percentage prescriptions with generic name

Over all, there was 53% prescription written by generic names in the metropolis (Table 1). The highest prescribing by generic name in a facility was 84%, while over 30% (4/12) of all the facilities prescribed drugs by generic names at a rate lower than 50%. As low as 18% of prescription by generic name was recorded in a facility. A comparison between public and private health facilities indicated that public health facilities had a statistically significant and higher overall prescribing by generic names than private facilities (61.7 vs. 44.8%; $P < 0.001$) (Table 2).

Percentage prescription from the essential medicines list

Overall, there was a mean (sd) of 95.7% (4.10) of prescribing from the EML in the metropolis (Table 1). All the health facilities, except one, issued over 90% of prescription from the EML. Only one facility had all (100%) of its prescriptions coming from the EML, with 84.6% being the lowest rate of prescribing from the EML in a facility. There was no difference between public and private health facilities regarding percentage prescribing from the EML ($P = 0.053$) (Table 2).

DISCUSSION

The overall average number of drugs prescribed in the Tamale metropolis (3.89) was higher than the WHO standard of 3 (WHO, 1998). As expected, the teaching health facility was closest in meeting the required optimum average (≤ 3). It was also observed that private health facilities in the metropolis prescribed more medicines per patient encounter than the public health facilities. Consequently, the highest average was encountered in a private facility, which had almost double of the optimum average number recommended (5.78±1.2). This observation suggests polypharmacy in most of the health facilities in the Tamale metropolis. Similar levels of polypharmacy, where average number of drugs were between 3.2 and 3.7, have been reported for different parts of Ghana (Bossu and Ofori-Adjei, 2000). Even higher averages have been reported for other developing countries such as India, with 5.6 (Akhtar et al., 2012), and Nigeria, with 5.2 (Uzoma et al., 1995). Reasons for these higher averages have been found in prescribing incompetence, the absence of clinical practice guidelines, intended financial benefit to the prescriber, poor or completely absence of programmes for continuous professional development of the prescribers and the shortage of medicines with high therapeutic efficacy (Atif et al., 2016).

In contrast to the high averages found in this study, Apanga et al. (2014), reported a lower average of 2.9 in a review of prescribing practices in rural communities in Ghana under the National Health Insurance Scheme. This lower rate may have been achieved due to the restrictive role the insurance scheme has that limits the number of drugs prescribed to a patient. A number of developing countries such as Botswana, Ethiopia, and Sri Lanka have shown acceptable average number of medicines per encounter, in the range of 0.98 to 3.0 (Boonstra et al., 2002; Desta et al., 2002; Ruwan et al., 2006).

In this study, the median percentage prescribing by generic names was a low of 53%, with the lowest observed in a private facility and the highest in a public facility. Similar levels of generic prescribing which were between 58 and 63% have been previously reported for countries such as Nigeria and Sudan (Tetteh and Afriyie, 2014; Dong, et al., 2010; Ofori-Adjei, 1992). There is even a report of a tertiary healthcare facility in Ludhiana, India, where generic prescribing was found to be as low as 25% (Singh, et al., 2003). Although generic prescribing in developing countries has always been below the recommended 100%, there are reports of higher rates of between 82 to 98.7% in Tanzania, Zimbabwe and Ethiopia (Ofori-Adjei, 1993; Desalegn, 2013).

A comparison between public and private health facilities showed that generic prescribing was largely low in private health facilities than in public health facilities. This pattern has earlier been described in a study in Mali (Maiga et al., 2006). Low levels of generic prescribing in private health facilities are anticipated, since the private health facilities are profit driven with patients likely to pay more for the branded prescriptions (Quick et al., 2002).

Prescribing by generic name allows exchange of information between health professionals and enhances the communication among healthcare providers, and also saves cost (Kohl, 2007; El Mahalli, 2012). We found all forms of antibiotic prescribing to be far higher than the WHO/INRUD recommended of ≤ 30% (WHO, 1998), and none of the facilities in the metropolis met the WHO standard. The only tertiary health facility in the study had 52% antibiotic encounters, and health centres, which offer primary health care, had rather higher antibiotic

encounters. With the exception of a singular report from the Police Hospital in Ghana, which reported 11.9 % antibiotic prescribing (Tetteh and Afriyie, 2014), there are reports that indicate higher rates of antibiotic prescription (GNDP, 2002). The high rate of antibiotic observed in the metropolis is not restricted to Ghana, but can be found in many other developing countries, including Ethiopia, where rates have reached 58% (Desalegn, 2013). The over-prescription and mis-application of antibiotics is a threat to public health as it drives the emergence of resistance strains of bacteria (Wiffen et al., 2001). Patient expectation to receive antibiotics for their illness, as well as cultural beliefs are noted reasons for the high use of antibiotics (Desalegan, 2013).These reasons may hold true for the Tamale metropolis.

The percentage encounter with injection for the metropolis was within the recommended optimum of ≤20% (WHO, 1993). On facility bases, five facilities met the optimum target, with public health facilities doing better than private facilities. Studies from other parts of Ghana have revealed lower levels of injection use. Two studies in Ghana have reported rates of 3.8 and 8.3% that comply with recommendations (Apanga et al., 2014). In the past, researchers found the level of use of injections to be between, 34.9 and 60% (GNDP, 2002; Bossu and Ofori-Adjei, 2000). Injections are very expensive when compared to oral forms, and also require trained personnel for their administration. Over-prescription of injections at the OPD when no compelling reasons exist is clearly irrational and unnecessary. This concern is of a major concern as injection use are often associated with a risk of blood-borne diseases. In addition to this risk, the need for effective disposal of sharps call for an effort to reduce the use of injectable forms.

The overall percentage prescribing from the EML in this study was 95.3% which is lower than the WHO/INRUD optimum of 100%. However, there was a public facility that complied with the recommendation where all its prescriptions were from the EML. The findings in this study are in line with those of the Ghana National Drugs Programme (GNDP), which reported rates between 92 to 93.9% (GNDP, 2002). Earlier studies from developing countries around the world were not different from our findings; for example, Ofori-Adjei (1993) reported 88 to 96% prescribing from the essential medicines list for Tanzania and Nepal, respectively (WHO, 1993). In our study, public health facilities had a relatively higher adherence to the EML than private facilities. The NHI of Ghana, as may be the case with other jurisdiction, seems to have a positive impact on this indicator as evidenced in the study by Apanga et al. (2014).

Medicines from the national list of EML have been in use over an appreciable period, with proven safety profile, are cost- effective and are locally available. This possibly is the reason for the better performance of this indicator. To ensure rational prescribing it is recommended that prescribers should adhere to national EML and formularies (EML, 2010). With a feature to indicate the level of care at which the medicines can be prescribed, the EML helps managers at the various levels of health care in the selection of medicines for procurement.

Conclusion

Prescribing within the Tamale metropolis was irrational, characterised by over-prescribing of medicines (polypharmacy), higher prescribing of antibiotics, and lower adherence with generic prescribing in all the health facilities of the metropolis. For all of these indicators mentioned, the private facilities performed poorly compared with the public one. Prescribing from the essential medicines list was overall encouraging, although still below the recommended 100%. Only prescribing of injectable forms met the WHO recommendations.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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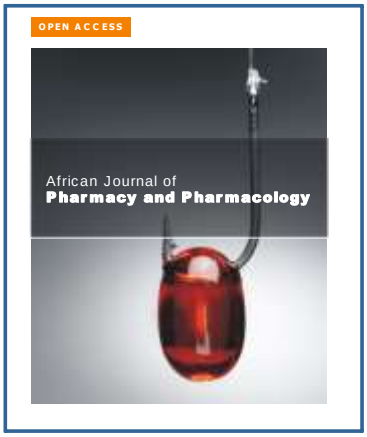

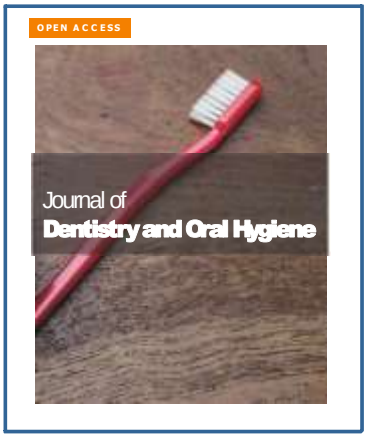

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