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EVALUATION OF DRUG PRESCRIBING PATTERN UNDER THE NATIONAL HEALTH INSURANCE SCHEME IN RURAL GHANA

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ABSTRACT: Inappropriate prescription and use of drugs is a major public health concern worldwide especially in developing countries and account for huge national health budgets. The objective of this study was to evaluate prescribing pattern of drugs under the national health insurance scheme in a rural and peri-urban setting using the World Health Organization prescribing indicators and to establish determinants of irrational drug prescribing patterns. A retrospective cross sectional study carried out for the whole of 2012 in the Kintampo North Municipality of the Brong-Ahafo Region of Ghana. Vetted outpatient department claim forms submitted by all facilities to the Kintampo Municipal Mutual Health Insurance Scheme were used. A total of 4238 claim forms were reviewed resulting in 12415 drugs prescribed. The average number of drugs per prescription was 2.9. Percentage of drugs: prescribed under their generic names, which contained an antibiotic, in injection form and from the essential drugs formulary were 99.8%, 36.6%, 3.8% and 100% respectively. Significant determinants of antibiotic prescription were all age groups (5-11 years $p < 0.0001$; 12-59 years $p < 0.0001$; ≥ 60 $p = 0.003$), second ($p = 0.002$) and fourth ($p = 0.003$) quarters of the year and the female sex ($p = 0.05$). There was polypharmacy and irrational prescribing of antibiotics in this setting. Significant determinants of antibiotic prescription were all age groups, second quarters and fourth quarter of the year and the female sex.

INTRODUCTION: The World Bank estimates that about 20%-50% of national health budgets by governments in developing countries are spend on drugs and other medical miscellaneous items, with most of this amount apparently being spent on irrational prescribing of drugs¹.

Inappropriate prescription and use of drugs is known to be a major health concern worldwide and more especially in developing countries with an associated high cost^{2,3}.

The World Health Organization defines the rationale use of medicines as "Patients receiving medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an appropriate period of time, and at the lowest cost to them and their community"⁴. Notwithstanding this explicit definition, irrational or non-rational use of medicine continue to rise

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resulting in more than 50% of all medicines worldwide being prescribed, dispensed or sold inappropriately, while 50% of patients fail to take them correctly⁵.

Since the year 2000 nearly 13 years now, there has been only one published research finding on prescribing practices at the primary health care level in Ghana⁶. This period was before the introduction of the National Health Insurance Scheme. In 2003, the government of Ghana passed the National Health Insurance (NHI) law (Act 650) with the ultimate goal of providing universal health insurance coverage for all Ghanaians, irrespective of their socio-economic background. This led to the subsequent introduction of the National Health Insurance Scheme in 2005.

Since the introduction of the scheme, drug bills have continued to rise over the years partly due to irrational prescribing habits as observed from reports of clinical audits by the national health insurance authority⁷. Currently no standardized study has been conducted to assess prescribing patterns especially at the primary health care level since the introduction of the scheme.

The aim of this study was to assess the prescribing pattern of drugs under the national health insurance scheme in a rural and peri-urban setting using the World Health Organization and International Network for Rational Use of Drugs (WHO-INRUD) prescribing indicators⁸. The study also explored certain factors that influenced irrational drug prescribing patterns as identified by the WHO-INRUD prescribing indicators criteria.

MATERIALS AND METHOD:

Study Design: This was a retrospective cross sectional study carried out for the complete period of 2012 to allow for the effect of seasonality on prescribing pattern.

Study setting and description: The study was conducted in the Kintampo North Municipality of the Brong-Ahafo Region of Ghana, which has a resident population of more than 95,000 people with most of these people living in the rural areas of the municipality⁹. The municipality is located in the centre of Ghana and has 1 municipal hospital as

a referral point, 13 Community-based Health Planning and Service (CHPS) compounds, 3 health centres and 4 private clinics.

The Kintampo Municipal Mutual Health Insurance Scheme is the only mutual insurance scheme in the municipality and is one of the over 140 mutual health insurance schemes operating in Ghana established in 2005. The scheme receives claim forms from all the 13 facilities (9 public and 4 private) across the entire municipality. A claim form essentially consists of 7 sections: Client information, services provided, procedures performed, diagnosis, investigations, medicines and client claim summary⁷. Claim forms are usually vetted before reimbursements are made to the facilities.

Sampling and data collection: Vetted outpatient department (excluding antenatal) claim forms submitted by all 13 facilities to the Kintampo Municipal Mutual Health Insurance Scheme within the study period was used as the sampling unit. Because each claim form allows for both single and multiple visits, we used only the first visit as an encounter in the case of multiple visits while a single visit was considered as an encounter in the case of single visits.

Four months comprising March, May, September and December were randomly selected to represent the first, second, third and fourth quarters of the year 2012, respectively. A maximum of 100 claim forms per quarter per facility were randomly selected by systematic random sampling after determining a sample interval from a sample frame per each facility.

Data for computation of core prescribing indicators of rational drug use were collected as stipulated by the WHO-INRUD of general outpatient care facilities⁸ and entered in Epi Info software version 3.5.1. Similarly, patient's demographic characteristics and period of the year were also collected and entered in the same software.

Statistical analysis: The same version of Epi Info software was used to organize, clean and analyze the data. Descriptive statistics included demographic characteristics of patients and WHO-INRUD core prescribing indicators such as:

The average number of drugs per prescription, the percentage of drugs prescribed by generic names, the percentage of drugs prescribed which contained an antibiotic, the percentage of drugs prescribed in injection form and the percentage of drugs from the essential drugs formulary.

The values of the indicators were calculated as follows:

1. Average number of drugs per encounter = total number of drugs prescribed / total number of encounters surveyed
2. Percentage of drugs prescribed by generic name = (number of drugs prescribed by generic name / total number of drugs prescribed) X 100
3. Percentage of encounters with an antibiotic prescribed = (number of patient encounters during which an antibiotic was prescribed / total number of encounters surveyed) X 100
4. Percentage of encounters with an injection prescribed = (number of patient encounters during which an injection was prescribed / total number of encounters surveyed) X 100
5. Percentage of drugs prescribed from essential drugs list = (number of drugs prescribed from essential drugs list / total number of prescribed drugs) X 100.

TABLE 1: SUMMARY OF WHO-INRUD CORE PRESCRIBING INDICATORS IN THE KINTAMPO NORTH MUNICIPALITY FOR 2012

Core drug indicator	Value	Number (N=12415)	WHO Optimal value
Average number of drugs per prescription	2.9	12415	<2.0
Percentage of drugs prescribed under generic names	99.8%	12384	100%
Percentage of drugs prescribed which contained an antibiotic	36.6%	1552	<30%
Percentage of drugs prescribed in an injection form	3.8%	160	<20%
Percentage of drugs from the essential drugs formulary	100%	12460	100%

Injections were prescribed more in the 12-59 age group and least in the ≥ 60 age group (**table 2**). The distribution of prescribed injections was also fairly equal across the whole year (**table 2**).

Antibiotics were found to be irrationally prescribed (**table 1**) and so we run a multiple regression module for this dichotomous variable.

Multivariate analysis using unconditional multiple logistic regression analysis was conducted for the dichotomous outcome variable (antibiotics prescribed) and other categorical dependent variables (sex, age group and period of year) with a p value of ≤ 0.05 taken as statistically significant.

RESULTS:

Patient characteristics: A total of 4238 claim forms (encounters) were reviewed with a total of 12415 drugs prescribed within the period. The median age of the patients was 11.0 years (Range: less than 1 month to 99 years). Out of the total encounters of 4238, 41.1% of the encounters were males while 58.9% were females.

Drug prescribing indicators: The average number of drugs per prescription, the percentage of drugs prescribed under generic names, the percentage of drugs prescribed which contained an antibiotic, the percentage of drugs prescribed in injection form and the percentage of drugs from the essential drugs formulary according to the WHO-INRUD criteria is shown in **table 1**.

Antibiotics were prescribed more in the <5 age group and least in the ≥ 60 age group (**table 2**). There was male antibiotic prescribing preponderance as compared to females (**table 2**). Table 2 also shows a fairly equal distribution of antibiotic prescription throughout the whole year.

All age groups were significant determinants of antibiotic prescribing patterns in this setting (**table 3**). The female sex was also a significant determinant of antibiotic prescribing pattern (**table 3**). All except the third quarter of the year were significant determinants of antibiotic prescribing pattern (**table 3**).

TABLE 2: DISTRIBUTION OF PRESCRIBED ANTIBIOTICS AND INJECTIONS IN VARIOUS AGE GROUPS, SEX AND PERIOD OF THE YEAR IN KINTAMPO NORTH MUNICIPALITY

Demographic characteristic	% of Antibiotics prescribed	% of Injections prescribed
Age group (years)	<5	41.0
	5-11	11.8
	12-59	38.6
	≥60	8.6
Sex	Male	43.0
	Female	57.0
Period of year	First quarter	29.6
	Second quarter	22.5
	Third quarter	23.5
	Fourth quarter	24.4

Determinants of irrational prescribing patterns

TABLE 3: DETERMINANTS OF ANTIBIOTIC PRESCRIBING PATTERNS

Variable	P value	
Age group	<5	Reference
	5-11	<0.0001
	12-59	<0.0001
	≥60	0.003
Sex	Male	Reference
	Female	0.05
Period of year	First quarter	Reference
	Second quarter	0.002
	Third quarter	0.06
	Fourth quarter	0.003

DISCUSSION: In this retrospective study involving 4238 encounters, the average number of drugs prescribed per encounter as shown in **table 1**, was found to be lower compared to the 4.8 drugs per patient previously recorded in 2000 in Ghana⁶. Although this figure is higher than the optimal figure of less than 2 drugs per encounter, it was however lower as compared to that of a Nigerian study where 6.11 drugs per encounter were prescribed¹⁰. Similarly other studies in some developing countries^{11, 12} reported higher figures than that in this study. Contrary to the findings of this study, studies done in some other developing countries such as Sudan, Zimbabwe and Palestine reported an average number of drugs per prescription to range between 1.3 and 1.4¹³. The average number of drugs prescribed in this study was found to be very similar to that of an Indian study¹⁴ where an average of 2.9 drugs per encounter was reported.

The finding of almost 100% prescribed drugs in their generic names conforms with the WHO recommendation of the need to prescribe and use drugs in their generic names, as they are cheaper

than branded substitutes and have equal potency⁴. This finding was however higher than that reported in other similar studies^{2, 3, 6, 10-13}. The reason for this high value is because the National Health insurance Scheme only reimburses drugs prescribed in their generic names as is found in the medicines list of the scheme⁷ and so over the years, facilities have learned to prescribe only generic drugs in order to maximize reimbursement.

Although there was over prescribing of antibiotics in this study, the percentage (36.6%) was far lower than that (60%) previously reported in Ghana⁶. As compared to this study, higher percentages ranging from 48.3% to 61.0% were reported in Yemen⁵. Similarly high percentages of up to 60% were also recorded in Yemen¹⁵, Sudan¹⁶ and Cambodia¹⁷. However, the average percentage of the antibiotics was found to be low (20.6%) in Mongolia¹⁸ as compared to our study.

Contrary to the very high percentage (80%) of prescribed drugs in injectable form previously found in Ghana, our study found only 3.8% (**table 1**) of drugs prescribed in injectable form an indication of a remarkably improved prescribing habit under the insurance scheme. This optimal value was achieved probably because most of the facilities were government facilities and the Ghana Health Service has over the years organized workshops and annual performance review meetings emphasizing the need to use injections judiciously.

Comparatively higher values were reported in Nigeria 71.7%¹⁰. Our finding was however similar to the 3.9% found in India¹⁹.

It appears not much has changed over the years after Bosu and Ofori-Adjei found that 97% of prescribed drugs were on the national essential drugs list⁶, a finding almost similar to the 100% in this study. A study in Ethiopia also revealed a similar optimal value of 100% prescribed drugs from the essential drug list²⁰. However, lower percentages were reported in other studies¹⁹ as compared to our findings. The reason for this high percentage of drugs prescribed from the essential drug list is because the insurance scheme pays for only drugs prescribed from their medicine's list which is based on the national essential drug list.

Our study showed a strong relationship between antibiotic prescription and age of patient with the relationship being weaker in the elderly age group (**table 3**). Antibiotics were generally prescribed more for females than males partly because health utilization by females was higher than males. The determinant of irrational prescribing using antibiotic was done because it was the only dichotomous variable that was found to be irrationally prescribed (**table 1**).

One of the strengths of this study unlike most studies is that it accurately reflects changing prescription patterns as a yearlong analysis was done. One other strength of this study is that, it's one of the very few studies that have looked at the effect of patient demographics on prescribing pattern (**table 3**). Other strengths of this study are that it is by far the largest study of drug prescribing indicators in rural Ghana and the first of its kind to be carried out since the introduction of the national health insurance scheme.

This study however had some limitations. Firstly as is usual of retrospective studies, incomplete data existed. This was however found to be so negligible in this study. Secondly because only claim forms submitted to the health insurance scheme were used in this study, any other prescription form that was not submitted to the scheme was excluded in the analysis which could have possibly affected the results and not give a completely true reflection of prescribing patterns in this setting. Thirdly, inpatient and antenatal prescribing patterns were not included in this study.

Finally because this study did not look at the characteristics of prescribers, the determinants of irrational prescribing were limited.

CONCLUSION: There was some polypharmacy and irrational prescribing of antibiotics in this setting. Other prescribing indicators were of optimal values. Significant determinants of antibiotic prescription were all age groups, second quarter of the year, fourth quarter of the year and the female sex.

We recommend that the Kintampo Municipal Mutual Health Insurance Scheme continue to engage relevant stake holders to ensure that there is a complete rationale prescribing habit by all health facilities that operate with the scheme.

We also recommend that further studies be conducted targeting prescribers specifically to help determine other factors that influence irrational prescribing in this setting.

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Ethical approval: Approval for data collection was granted by the management of the Kintampo Municipal Mutual Health Insurance Scheme.

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