

Full Length Research Paper

A comparative study of prescribing patterns in two tertiary care teaching hospitals in Lagos, Nigeria

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Worldwide, it is estimated that over half of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take their medicine correctly. Measuring drug use is a requirement for improving drug use either at the individual facility or national level. Much work has been done by World Health Organization (WHO) and the International Network on Rational Use of Drugs (INRUD) in providing tools for such measurements. The main objective of this work was to document and compare prescribing patterns in two teaching hospitals in Lagos State using WHO/INRUD developed indicators. The survey was conducted in the Lagos State University Teaching Hospital (LASUTH) and the Lagos University Teaching Hospital (LUTH). Prescriptions were sampled in both facilities and data required to document prescribing patterns collected. A total of 933 prescriptions were surveyed. Results obtained revealed that in the two facilities the average drugs used per encounter was 3.55, generic prescribing was less than 50% and encounters with antibiotics are high. On analysis, statistically significant differences existed on average number of drugs prescribed, use of generic nomenclature, percentage antibiotic use and percentage injection use in the two facilities. Long-term, intensive interventions should be carried out to ensure rational use of drugs in these facilities that are *centers of excellence* in medical and pharmaceutical care.

Key words: Rational drug use, investigating drug use, teaching hospitals, prescribing indicators, WHO/INRUD drug use indicators.

INTRODUCTION

After any clinical diagnosis; the practitioner can often select from a variety of therapeutic approaches which include: medication, surgery, psychiatric treatment, radiation, physical therapy, health education, counseling, further consultation and no therapy (Quick *et al.*, 1997). Of these options, drug therapy (medication) is by far the one most commonly chosen and one of the most cost-effective medical interventions known (ICIUM, 2004; Holloway, 2006). In most cases this requires the writing of a prescription (Katzung and Lofholm, 2004). Good quality prescriptions are extremely important for minimizing errors in the dispensing and administration of medications (Meyer, 2000). Pharmaceuticals are indispensable to health systems by complementing other

types of health care services. They reduce morbidity and mortality rates and enhance quality of life (Quick *et al.*, 1997). Therefore access to health care and essential medicines is increasingly being viewed as a fundamental human right. Yet the ability of pharmaceuticals to save lives, reduce suffering and improve health depends on their being of good quality, safe, available, affordable and properly used (WHO, 2009). Availability of drugs is one factor known to improve utilization of health services (Yasmeen *et al.*, 2011).

Health budgets in developing countries like Nigeria are generally small, when compared to developed countries, and 30 to 40% of the total health budget is spent on drugs (Srishyla, 1994; Rehana *et al.*, 1998; Arustiyono, 1999; Tamuno and Fadare, 2012). Considering the small amount of funds available for drugs, it is desirable that drugs are prescribed, dispensed and used rationally for the optimal benefit of the patient (Erah *et al.*, 2003). Worldwide, it is estimated that over half of all medicines

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are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take their medicine correctly (Hogerzeil, 1995; WHO, 1985). Medicines are used rationally when patients receive the appropriate medicines, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost both to them and their community (WHO, 1985, 2002). Irrational use occurs when one (or more) of these conditions is not met. In spite of available tools and information on how to measure medicines use and the intervention strategies needed to achieve this, irrational use continues to occur. This is wasteful, expensive and dangerous, both to the health of the individual patient and to the population as a whole. Inappropriate use of medicines, and the related illness and deaths, are not restricted to low-income countries. Studies in Canada, Australia, Kuwait and the USA, as well as in middle-income countries such as South Africa and Thailand, have revealed that inappropriate use of medicines is widespread in teaching hospitals (Hogerzeil, 1995; WHO, 2004).

The actual use of pharmaceuticals does not always comply with the conditions for rational drug use. It is influenced by factors such as availability, provider experience, economic interests, cultural factors and community belief (Trap, 2002; Arustiyono, 1999). Correct prescribing, prescription and dispensing are indicators of rational drug use (Quick *et al*, 1997; WHO/EDM, 1997; Express Pharma Pulse, 2004; Holloway, 2006). Use is the most critical function of the drug management cycle (Quick *et al*, 1997). Measuring drug use is a requirement for improving drug use either at the institutional level or nationally. The World Health Organization (WHO) and International Network on Rational Use of Drugs (INRUD) have done much work in providing tools or indicators for measuring drug use (WHO, 1993; INRUD, 2004). Early studies used some of the core indicators to quantify the impact of essential drugs programmes or of specific interventions within such programmes (Laing and Ruredzo, 1989; Quick *et al.*, 1991). Following a review of the revised indicators in 1991 and a second series of field tests in Nigeria and Tanzania in 1992, the present set of indicators was finalized (Hogerzeil *et al*, 1993).

The main objective of this project was to document the current prescribing practices in two tertiary care teaching hospitals in Lagos State using the WHO/INRUD developed indicators for investigating drug use in facilities. A comparison was carried out thereafter, between the two facilities in order to provide guidance on the type of practices that need to be curbed. The work was designed as a retrospective baseline study in order to provide information that will guide future activities.

MATERIALS AND METHODS

This survey was conducted in the two teaching hospitals in Lagos State: Lagos State University Teaching Hospital

(LASUTH), Ikeja and the Lagos University Teaching Hospital (LUTH), Idiaraba. Though there are other tertiary hospitals in Lagos State, these two are the only teaching hospitals in the state and they were selected for this reason. In both hospitals, over two thousand prescriptions are dispensed in the out-patient pharmacy department each month.

A retrospective survey of prescriptions stored in the out-patient pharmacy department over a three-month period in 2 consecutive years was carried out in each facility. A list of years from 2000 to 2007 was generated and using a modified envelope method using strips of paper with each year recorded on it a random selection of the first year was made and the year 2000 was chosen. The process was repeated with the months of the year and January was chosen. Thus, prescriptions from January to March in years 2000 and 2001 were selected. Every fifth prescription was selected for the three busiest days at the hospitals – Monday, Tuesdays and Thursdays. For comparative analysis, the WHO requires that a minimum of one hundred sampling units should be assessed (WHO, 1993). However, the larger the sample size, the more reliable the data, hence, the sample size used was more than one hundred. The WHO/INRUD detailed prescribing indicator form (WHO, 1993) was used to collect relevant information from the facilities.

Data collected was analyzed using the standardized WHO/INRUD formulae to assess and document the observed treatment patterns by determining:

- a) Average number of drugs per encounter
 - b) Percentage of drugs prescribed by the International non-proprietary name (INN or generic nomenclature)
 - c) Percentage of encounters in which an antibiotic is prescribed
 - d) Percentage of encounters in which an injection is prescribed
 - e) Availability of hospital formulary or national formulary
- Results were represented as frequencies, percentages and means as appropriate. In some cases as appropriate, inferential statistics using the Chi-squared test (at 95% confidence interval, $p=0.05$) was utilized

RESULTS

A total of nine hundred and thirty three (933) prescriptions were assessed in the two facilities. LASUTH prescriptions represented 46.2% of the total data. About 55.0% of the total prescriptions were for females and over 80% were for adults. Both facilities have copies of their formularies available in the pharmacy departments (Table 1).

An average of 3.55 drugs per prescription per facility was prescribed. Number of drugs prescribed ranged from 1 to 11 drugs with most ranging from two to four drugs. The differences in the results obtained were statistically

Table 1. Demographic information on prescriptions.

Item/ frequency	LASUTH (%) n=431	LUTH (%) n=502	Total (%) n=933
Sex			
Male	142 (32.9)	213 (42.4)	355 (38.0)
Female	244 (56.6)	272 (54.2)	516 (55.3)
Blank	45 (10.4)	17 (3.4)	62 (6.6)
Age			
Below 12 years	14 (3.2)	69 (13.7)	83 (8.9)
Adults (above 12 years)	377 (87.5)	406 (80.9)	783 (84)
BLANK	40 (9.3)	27 (5.4)	67 (7.2)
Facility formulary?	Available	Available	

Table 2. Number of drugs and injections dispensed.

Item/ frequency	LASUTH (%) n=431	LUTH (%) n=502	Total (%) n=933	χ^2
Number of drugs dispensed				
1 DRUG	31 (7.5)	44 (8.8)	75 (8.0)	
2 DRUGS	73 (17.7)	104 (20.7)	177 (19.0)	
3 DRUGS	149 (36.1)	103 (20.5)	252 (27.0)	37.7 (df = 6)
4 DRUGS	101 (24.5)	101 (20.1)	202 (21.7)	
5 DRUGS	40 (9.7)	69 (13.7)	109 (11.7)	
6 DRUGS	26 (6.3)	43 (8.6)	69 (7.4)	
>6 DRUGS (7-11)	11 (2.6)	38 (7.6)	49 (5.2)	
Average number of drugs	1466/431 = 3.40	1848/502 = 3.68	3314/933 = 3.55	
Number of generics prescribed				
0 Generic Items	119 (28.8)	148 (29.5)	267 (28.6)	
1 Generic Item	159 (38.5)	112 (22.3)	271 (29.0)	
2 Generic Items	106 (25.7)	123 (24.5)	229 (24.5)	39.7 (df = 4)
3 Generic Items	34 (8.2)	75 (14.9)	109 (11.5)	
>3 Generic Items (4-7)	13 (3.1)	44 (8.8)	57 (5.1)	
Generic prescribing (%)	527/1466 x 100 = 36.0%	780/1848 x 100 = 42.2%	1307/3314 x 100 = 39.4%	

significant at 95% confidence level as the calculated chi-square was 37.7 at six (6) degrees of freedom. Generic prescribing was done for 39.4% of the encounters in the two facilities. Generic items ranged from 1 to 7 drug items but mostly only one to three drugs were prescribed by generic name. The differences in the results obtained in the two institutions were statistically significant at 95% confidence level as the calculated chi-square was 39.7 at 4 degrees of freedom (Table 2).

The percentage antibiotic use in LASUTH was 36.2% compared to 49.2% in LASUTH (Figure 1). A statistically significant difference existed between the results obtained in the two institutions at 95% confidence level, $p=0.00006$. Injection use was an average of 5.8% across both facilities (Figure 2). Again, statistically significant

differences existed between the results obtained in the two institutions at 95% confidence level, $p=0.0007$.

DISCUSSION

The result obtained in LASUTH is similar to previous work done in the same institution where the average was found to be 3.5 (Odusanya, 2004). The range of drugs prescribed was between 1 and 9 just like in this current survey but range obtained in LUTH was between 1 and 11. A survey carried out on two tertiary health facilities in North-Western part of Nigeria gave comparable results of average drugs use per encounter of 3.5 (Ibrahim, 2004). From the survey carried out by the WHO/INRUD,

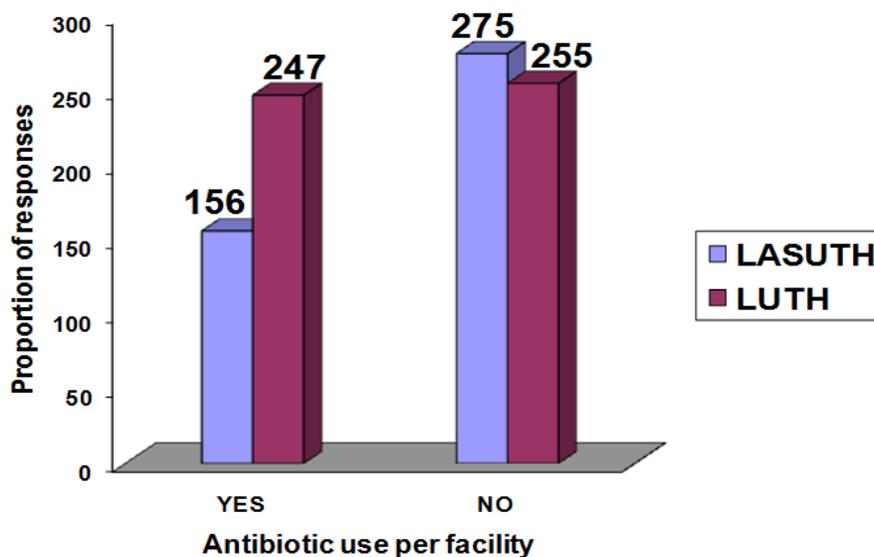


Figure 1. Antibiotic use per facility ($\chi^2 = 15.99$, p value = 0.00006).

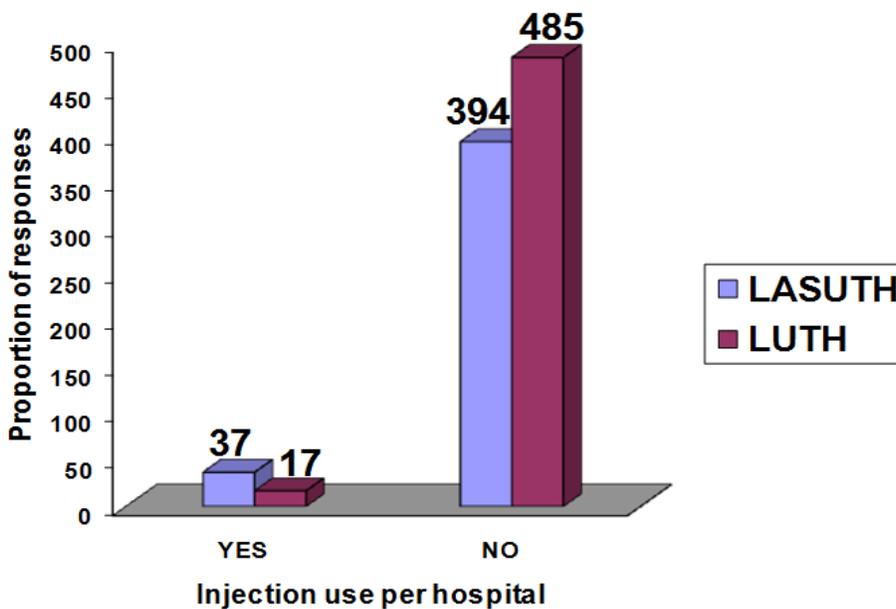


Figure 2. Injection use per facility ($\chi^2 = 11.49$, p value = 0.0007).

average number of drugs per encounter was about 4 drugs per encounter for Nigeria compared to Sudan and Zimbabwe which had less than 1.5 drugs per encounter each. Ghana on the other hand had a value of almost 4.5 drugs per encounter (Hogerzeil *et al*, 1993). The WHO/INRUD standard is put at less than 2 drugs per prescription on the average (De Joncheere, 2002). The result of 3.4 drugs per prescription is similar to the result obtained in Kenya as its pre-intervention value (Shah, 2007). A statistically significant difference exists between

the results obtained in LASUTH and in LUTH on number of drugs per prescription. This could be due to pattern of disease in the two hospitals. The result obtained in this survey compared to the survey done by Odusanya (2004) proves that data obtained were from the same year.

Total generics as indicated by the WHO should be close to 100% (De Joncheere, 2002). However, results obtained in the facilities were less than 50% in each case. Many factors influence prescribing using generic nomenclature including prescribers' confidence and trust

in branded products, influence of drug marketers and inadequate literature to confirm claims on bioequivalence and bioavailability of generics. The survey by Ibrahim in the North-West of Nigeria gave higher values of 55.7% generic prescribing (Ibrahim, 2004). Also in the survey carried out in a tertiary facility in Kenya, 40% generic prescribing was obtained (Shah, 2007) while this survey yielded 42.2% in LUTH and 35.95% in LASUTH. Zimbabwe and Tanzania had values greater than 80% while Nigeria and Ghana had values between 55 and 60% in the study conducted by Hogerzeil *et al.* (1993). In a survey measuring prescribing indicators in the elderly in London, 84% of the prescriptions were written using generic nomenclature compared to the results obtained in most of the developing countries (Batty *et al.*, 2003). A statistically significant difference also exists in the results obtained in LASUTH and LUTH with respect to numbers of generics dispensed per encounter.

Antibiotic use is high in the facilities surveyed. The World Health Organization (WHO) advocates that the percentage of encounters in which an antibiotic is prescribed should be less than 30% for it to be considered rational. However, survey results obtained were 36.2% in LASUTH and 49.2% in LUTH and this difference is statistically significant. Though, antibiotic use is influenced by the pattern of infection in a particular region as diagnosis is not captured on prescription sheets, a decision on the need for the antibiotics could not be made by the researchers. Antibiotic prescribing is a problem in many developing countries including Nigeria (Chalker, 2003) with physicians prescribing antibiotics for non-indicated conditions such as viral infections like diarrhea, uncomplicated malaria which requires anti-malarials only and to satisfy patients demands (Okeke *et al.*, 1999; Sivagnanam *et al.*, 2004; Gwimile *et al.*, 2012). For example, in a study in Northwest Nigeria, percentage antibiotic use was 51.2% (Ibrahim, 2004). In the study conducted by Hogerzeil, *et al.* in Kenya and the United Arab Emirates had percentage antibiotic encounters of 40 and 45% respectively pre-intervention. Uganda and Sudan had well over 50% of the encounters having an antibiotic prescribed; Nigeria and Ghana had about 50% antibiotic encounters while Zimbabwe and Tanzania had less than 40% antibiotic encounters. In fact Zimbabwe had values just over 30% which is the ideal for rational antibiotic prescribing (Hogerzeil *et al.*, 1993).

Percentage of encounters with an injection should be less than 10% going by the WHO/INRUD Standard. Though the values obtained for this value meets this criteria in this survey, it cannot be said to be an index of rational prescribing for two main reasons. The first is that the outpatient departments in these facilities do not dispense nor sell injections and so prescriptions with injections are not usually sent there. Injections not required on routine basis are sent to the emergency department for purchase. The second reason is that

because nursing staff administer injections, most of the injections that will be required for routine use are made available to the nursing bay on an as-requested basis. Thus only few prescriptions with injections get sent to the OPD unit in each of these facilities. In Northwest Nigeria, percentage injection use was 40.6% and the survey by Odusanya (2004) on LASUTH alone was also low with a value of 13.6%. In a similar study conducted in Indonesia, percentage encounters with injections ranged from 10 to 80% (Arustiyono, 1999). Hogerzeil *et al.* in 1993 found that percentage of encounters with injections was as high as 48 - 58% in Uganda and Ghana, between 30 and 35% in Tanzania and Nigeria and about 10% in Zimbabwe. Again the difference obtained in encounters with injection between LASUTH and LUTH is statistically significant.

Interventions need to be carried out to correct these drug use problems that have been documented severally. For instance, in another survey carried out in Nigeria in 1992, the average number of drugs per encounter was found to be 3.8. (Ross-Degnan *et al.*, 1992). From that time to now, this drug use problem has not been significantly addressed. Average values are still higher than 3.5. Studies on the effectiveness of intervention techniques on the quality of health care and prescribing behaviour of physicians in developing countries are greatly needed. However, guidelines for rational prescribing are either not available or not effectively implemented in many developing countries. In 1995, Hogerzeil described several strategies which have been tried, mainly in industrialized countries, to promote rational prescribing (Hogerzeil, 1995). These are: a) educational strategies such as printed material, seminars, bulletins and face-to-face methods; b) managerial methods referring to various restrictions on prescribing; c) regulatory measures including procedures to critically evaluate drugs and product information. Hospital formularies and special committees for treatment of infections have also been reported to be useful in reducing the misuse of drugs.

CONCLUSION AND RECOMMENDATIONS

In conclusion, average drugs prescribed per encounter was 3.55 drugs (3.4 in LASUTH, 3.68 in LUTH), prescribing by generic nomenclature was 39.4% across facilities (36% in LASUTH, 42.2 in LUTH) and percentage of encounters in which an antibiotic is prescribed was 43.2% (36.2% LASUTH, 49.2% LUTH). Percentage of encounters in which an injection was prescribed was 5.8% (8.6% LASUTH, 3.4% LUTH).

It is recommended that long-term, intensive interventions be carried out to correct identified inadequate practices. Training on rational use of drugs using the indicators and results of similar studies should be carried out extensively in the two facilities. Follow up studies should be carried out to confirm that the

information is being utilized and that new positive behaviour is sustained. Also future qualitative studies should be carried out to determine factors influencing the differences in prescribing patterns determined.

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