African Journal of Pharmacology and Therapeutics Vol. 6 No. 2 Pages 96-101, 2017
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Research Article

One-day out-patient prescribing patterns at a national referral hospital in Kenya

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Background: Poor prescribing habits lead to ineffective and unsafe treatment for patients, exacerbating or prolonging of illness as well as causing distress and harm to them. Drug utilization studies can help identifying gaps in prescribing and feed the results back to prescribers to enhance future rational use of medicines.

Objective: Evaluate outpatient prescribing practices and patterns in a leading national Hospital in Kenya.

Methods: A sample of 60 prescriptions was selected by quasi-random sampling. Data was abstracted using a pre-designed data collection form, entered into and analyzed using Excel software.

Results: The average number of drugs prescribed per prescription was three with a polypharmacy rate (>4 drugs) of 20%. Only two-thirds (65%) of the prescribed drugs were actually dispensed at the hospital pharmacy due to shortages, principally shortages of originators. Slightly more than half (52%) of the drugs were prescribed by generic name. Prescribing by brand names was highest among medical interns (61%). Almost all drugs prescribed (95%) were consistent with the hospital tender list.

Conclusions: There is a need to increase the rate of prescribing of generics to save costs as well as reduce stock-out levels. This can be helped by instigating a comprehensive generics policy. There is also a need to strengthen and empower drugs and therapeutic committees (DTCs) to improve selection and availability of quality generics to win the confidence of prescribers.

Keywords: Drug utilisation studies, generics, prescribing patterns, prescribing indicators, polypharmacy, WHO indicators, Kenya

Received: March, 2017
Published: June, 2017

1. Introduction

Prescribing is an important step in the medicine use cycle. Inappropriate prescribing habits lead to ineffective treatment, greater toxicity and higher costs to the healthcare system and patients. Examples of inappropriate prescribing include poly pharmacy, prescribing of brand names rather than international non-proprietary name (INN) prescribing as well as the overuse of antibiotics (Cameron et al, 2012; Desalegn et al, 2013; Patterson et al, 2012; Markovic-Pekovic et al, 2016; Godman et al, 2013a; Little et al, 2013). Poly pharmacy should be discouraged where possible as it increases the chance of adverse drug reactions and drug

interactions, the cost of drugs and promotes non-adherence (Desalegn et al, 2013; Patterson et al, 2012; Markovic-Pekovic et al, 2016; Hines et al, 2011; Hamilton et al, 2009).

In developing and transitional countries, it has been estimated that fewer than 40% of patients are currently treated in line with published guidelines (Holloway et al, 2011; Holloway et al, 2013). This is important given the current low spending on health care among African countries, especially in sub-Saharan Africa, and the high expenditure on pharmaceuticals that is a burden to these healthcare systems and patients (Kaseje et al, 2006; Cameron et al, 2009). Some of the causes of inappropriate prescribing are inadequate knowledge about prescribing, pressure from patients, promotion by originator pharmaceutical companies including raising concerns with generics, and copying poor examples from fellow prescribers (Baumgärtel et al, 2012; Bhartiy et al, 2008; Cessak et al, 2016; Civaner et al, 2012; Davis et al, 2013; Hassali et al, 2015; Labiris et al, 2015; MdRezal et al, 2015; Sabuncu et al, 2009; Spurling et al, 2010).

Drug utilization studies such as prescription surveys can identify areas of concerns and provide feedback to prescribers to enhance the appropriate use of medicines. World Health Organization (WHO) prescribing indicators measure prescribing practices of health care providers and are useful tools to promote rational prescribing (WHO 1993). A recent review among developing and transitional countries suggested for instance that 45% to 54% of patient encounters still result in a prescription for antibiotics and only 65% of medicines are prescribed by generic name (Holloway, 2013).

This study sought to build on these studies by evaluating current prescribing practices and patterns in Kenya, initially at a national referral hospital. Subsequently, use these findings to develop future research strategies and initiatives to improve the appropriateness of future prescribing within our hospitals.

2. Methods

2.1 Study design

A descriptive hospital based cross-sectional study was undertaken to describe a one-day prescribing patterns using the WHO prescribing and patient care indicators. The study was conducted on 13th June 2013.

2.2 Study Site

The study was carried out at the out-patient pharmacy of the Kenyatta National Hospital (KNH), which is the largest national teaching and referral hospital in Kenya. The hospital is located in Nairobi, Kenya's capital city, and has a busy out-patient pharmacy that serves diverse patients from the Nairobi metropolis

2.3 Sampling procedure

A quasi-random sampling method was employed to obtain a sample size of one third (65) prescriptions out of the total population of 190 prescriptions received at the out-patient Pharmacy on 10th June 2013. One third was chosen to provide a reliable sample without being labour intensive. Prescriptions that were written before or after 10th June 2013 or those that did not originate from KNH were excluded. Out of the 65 prescriptions sampled, only 60 finally met the inclusion criteria and were therefore included in the study. We used the hospital drug tender list as a surrogate for the official drug policy documents such as the essential drugs list (EDL) or the hospital formulary since at the time of the study, the hospital formulary of KNH was still in the process of compilation.

2.4 Data collection

Data was abstracted from sampled prescriptions. A pre-tested data abstraction form was used to collect relevant data pertaining to WHO prescribing and patient care indicators, patient demographic characteristics and prescriber characteristics.

2.5 Outcomes

Outcome measures included the number of medicines in a prescription, prescribing by generic name, poly pharmacy (four or more medicines per prescription) (Patterson et al, 2012), compliance with hospital medicine tender list/formulary when prescribing and percentage of medicines actually dispensed. The variables were patient sex, patient age, prescriber sex and prescriber cadre.

2.6 Data analysis

Data were analyzed using Excel software (MS Excel 2007). All variables were subjected to descriptive data analysis. Continuous variables that were normally distributed were expressed as mean and standard deviation (SD). For continuous variables that were not normally distributed, the median and inter-quartile range (IQR) was reported. Categorical variables were reported as proportions.

2.7 Ethical Considerations

Permission to carry out the study was granted by the Kenyatta National Hospital. Data collected from prescriptions were coded to remove patient identifiers for confidentiality purposes.

3. Results

A total of 60 prescriptions were included in the study. The baseline characteristics of the study subjects are summarized in **Table 1**.

Approximately two thirds (65%) of the study subjects were females. The median age for the subjects was 30 (IQR: 15 – 43) years ranging from 5 to 75 years. Most of the prescribers were males (60%). Medical Interns generated half of the prescriptions.

The average number of medicines prescribed per prescription was three. Slightly more than half (52%) of the drugs were prescribed by generic name, indicating that 48% of the medicines were prescribed by brand names.

Prescribing by brand names was more common with fixed-dose combination drugs (70%) compared to single formulations (30%). These results are summarized in **Table 2**.

Table 1: Baseline characteristics of study subjects

Baseline characteristic	N=60
Patient demographics:	
Sex:	
Male n(%)	21 (35%)
Female n(%)	39 (65%)
Age in years, Median (IQR)	30 (15 – 43)
Prescriber characteristics:	
Sex:	
Male n(%)	36 (60%)
Female n(%)	24 (40%)
Cadre:	
Medical Interns n (%)	30 (50%)
Medical Registrars n (%)	21 (35%)
Medical Specialists/Consultants n (%)	9 (15%)

Prescribing by brand name was highest among medical interns (61%), followed by medical specialists/consultants (52%), with medical registrars showing the least tendency to prescribe using brand names (34%).

Only approximately two-thirds (65%) of the prescribed medicines could actually be dispensed in the out-patient pharmacy at the time implying a 35% stock-out level. Encouragingly, a high proportion of medicines prescribed (95%) were consistent with the hospital tender list.

Prescription of four or more medicines per prescription (polypharmacy) was encountered in 20% of the prescriptions as shown in **Table 3**.

4.0 Discussion

This study described prescribing patterns using WHO prescribing and patient care indicators in an out-patient setting at Kenya's largest referral hospital. Encouragingly, prescribing compliance to the hospital drug tender list was 95%, although lower than the WHO suggested threshold of 100%. However, this rate of compliance was higher than the 72.2% reported in a previous study in Kenya (Muyu et al, 2013).

Table 2: Prescribing and patient care indicators for study subjects

Prescribing Indicators	Number or %	WHO threshold
Average number of medicines prescribed per prescription	3	<2
% of medicines prescribed by generic name	52%	100%
% of medicines actually dispensed per prescription	65	100%
% of medicines prescribed consistent with hospital tender list/Essential Drugs List or Formulary	95%	100%
Total number of prescriptions sampled	60	
Total number of medicines prescribed	155	

Table 3: The Distribution of the number of drugs per prescription among study subjects

No. of drugs per prescription	No. of prescriptions	Percentage (%)
1	9	15
2	15	25
3	24	40
4	9	15
>4	3	5
Total	60	100

The average number of medicines per prescription in this study was 3.0, which was higher than that observed in a recent Ethiopian study where there were 2.2 medicines per prescription (Bilal et al, 2016). However, lower than the 4.0 medicines per prescription reported in another hospital based study in Kenya (Muyu et al, 2013). Overall though, the degree of polypharmacy in this study was low at 20%. This could be attributed to the relatively youthful study population with a median age of 30 years (IQR 15-43), with a range of 5 to 75 years, and mostly female (65%). Published studies have correlated polypharmacy with increasing age of patients and female gender (Holbeach et al, 2010), with co-morbidities and the resultant use of medicines increasing with age (Bushardt et al, 2008). Even though the polypharmacy observed in our study was not stratified by age and gender, it is possible to speculate that study subjects over 60 years were mainly female and prone to using multiple medications to manage their co-morbidities (Markovic-Pekovic et al, 2016).

Just over half the medicines in this study were prescribed by generic name (52%). This was much lower than the high rate of generic prescribing (97%) reported in the recent Ethiopian study (Bilal et al, 2016); however, our findings were comparable to the low rates of generic prescribing (42% - 50%) reported in tertiary care hospitals in Nigeria (Enwere et al, 2007, Tamuno et al, 2012). Encouragingly, our results were higher than the generic prescribing of 25.6% seen earlier in another public hospital in Kenya (Muyu et al, 2013). The rate of generic prescribing observed in the Kenyan and Nigerian studies though were way below the suggested WHO threshold for generic prescribing (100%), and are reflective of the poor generic prescribing habits. This may be due to poor knowledge of prescribers regarding generic products including fears of therapeutic failure (Fadare et al, 2015).

The high rate of prescribing branded products is a concern considering the low socioeconomic status of patients attending public hospitals. The use of branded products has been associated with escalating costs of healthcare, with studies reporting that substantial savings can be realized by switching to generic prescribing in developing countries (Cameron et al, 2012). The prescription of branded products in our study also contributed to the extent of drug stock-outs (35%), with stock out rates similar to the 45% reported in the study by Muyu et al (2013). This is against suggested WHO requirements that 100% of the medicines prescribed for patients in hospitals should be available at the health facility. Our findings point to a possible need to appreciably reduce direct promotional activities to clinicians by medical representatives and instead provide continuous medical education (CMEs) to motivate prescribers through peer modeling. This has been successful in for instance Stockholm County Council in Sweden, leading to high adherence rates in ambulatory care to a list of approximately 200 medicines (Gustafsson et al, 2011; Bjorkhem-Bergman et al, 2013; Godman et al 2009). Also, there may be a need to strengthen and empower hospital drugs and therapeutic committees to improve selection and availability of quality generics to win the confidence of prescribers. Published studies have shown similar outcomes between generics of high quality and originators (brands) across a wide range of products and disease areas (Baumgartel et al, 2012; Kesselheim et al, 2008; Gagne et al, 2014; Paton et al, 2006; Veronin et al, 2011; Godman et al, 2015; Corrao et al, 2014).

Failure by the hospital pharmacy to meet expectations in filling all prescriptions is likely to have negative health and economic consequences on patients such as worsening health conditions and the necessary purchase of more expensive medicines in the private sector.

Our study did not explore the potential for a generic substitution policy across sectors. However, the recent study in tertiary institutions in Nigeria reported that most physicians (64%) would currently object to such a policy (Fadare et al, 2015). Another option is to start training physicians in medical schools to prescribe by the generic name only and follow-up with further education once qualified. This has worked well in the UK with INN prescribing rates of 98 – 99% across a range of molecules and classes (Godman et al, 2013b).

In this study, medical interns had the highest tendency (61%) to prescribe medicines using brand names compared to medical registrars (34%). Whilst there is a need to explore this further, we could speculate that it could be due to promotional activities of pharmaceutical companies targeting medical interns who are still inexperienced in medical practice. Other studies have reported that promotional activities of pharmaceutical companies often have a strong influence on prescribing habits both in Africa (Fadare et al, 2015) and in other countries (Riaz et al, 2015). It is noteworthy that in Kenya, generic products exist as "branded generics" leading to a multiplicity of products containing the same active ingredient aggressively marketed by generic importers or local manufacturers

Another interesting finding of this study was the observation that 70% of brand name prescribing was in fixed dose combinations (FDCs). This may be due to prescribers finding difficulty in writing out the lengthy generic names of the single constituents; alternatively pressure from pharmaceutical companies as the prices of FDCs may often be higher than the constituent parts (Kalaba et al, 2012). There is a steady rise in FDCs in Kenya especially for cardiovascular diseases, diabetes and pain management. So far no attempt has been made locally to rationalize the appropriateness of some of these combinations despite ongoing debate on their benefits regarding their effectiveness, compliance and typically a price premium versus titrating each component separately (Kalaba et al, 2012; Bangalore et al, 2007; Mancia et al 2009). This needs addressing in the future.

Study limitations

We are aware that this study covered only one day of prescribing practices while the WHO recommends that a drug indicator study should cover a longer period of time (WHO-1993). However, as a rapid assessment tool, the study has provided an impetus for further studies as well as provided a basis for discussions within the Ministry of Health in Kenya.

5.0 Conclusion

The degree of polypharmacy in this study was low at 20%. This study also identified various shortcomings in prescribing practices in Kenya. Generic prescribing was low, with just over half the medicines prescribed by generic name. The high rate of prescribing branded products is a concern considering the low socioeconomic status of patients who attend public hospitals in Kenya.

Conflict of Interest declaration

The authors declare no conflict of interest.

Acknowledgements

The authors wish to acknowledge support from the Pharmacy staff of the Kenyatta National Hospital during data collection. The write up of this paper was in part supported by the Karolinska Institutet as well as VR-Link grant from Swedish Research Council (VR-Link 2013-6710).

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