

Evaluating drug prescription patterns in children according to World Health Organisation's indicators, Kigali, Rwanda: A cross-sectional study

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Abstract

Background Irrational drug use is a worldwide problem at all levels of health care, especially in hospitals. Prescribers in community tend to omit hospital prescribing practices, thus this problem is present at all levels of health care. Use of medicines can be greatly improved and wastage reduced if simple principles of drug management are followed. To help in solving this problem, World Health Organization (WHO) has designed prescribing core indicators that were used to evaluate drug prescription patterns in Rwanda Social Security Board (RSSB) affiliated patients.

Material and Methods A retrospective cross-sectional study with quantitative analysis was carried out for a period of six months. Among the 1000 prescriptions collected, 18 of them were rejected for not fulfilling the inclusion criteria, the remaining 982 prescriptions were almost distributed equally from either private and public hospital or clinics. The study analyzed prescriptions from health facilities located in Kigali City, Rwanda. The results were presented in table with comparisons with the WHO prescription indicators.

Results The average number of drugs per prescription is 2.4 which is higher than 1.8 recommended by WHO. The percentages of drugs prescribed with a generic name and those from National Essential drug List are 28.5% and 61.1% respectively, which are very low compared to WHO target of 100% for both core prescribing indicators. The percentage of encounters with an antibiotic prescribed is 42.5% and the encounters who received an injections account 1.2%.

Conclusion This study revealed that there is a big gap in implementing WHO core indicators of prescription and concerned stakeholders should take measures to address this issue.

Introduction

Inappropriate drug use is a worldwide problem at all levels of health care, especially in hospitals. Prescribers in community tend to omit hospital prescribing practices, therefore, this problem is present at all levels of health care. Use of medicines can be greatly improved and wastage reduced if simple principles of drug management are followed. However, it is difficult to implement these principles because they require interdepartmental commitment(1).

The World Health Organization (WHO) defined rational drug use as the medication given to the right patients, right dose and duration, right route of administration and at the lowest cost to them and their community. Thus, appropriate drug utilization is essential in achieving quality of health and medical care for patients(2).

Prescriptions are categorized into two types: rational and non-rational, the latter has many consequences such as adverse drug reactions, increased frequency of drug-drug interactions and increased healthcare costs (3)

Prescriptions monitoring is essential in identifying the issues of non-rational prescribing patterns such as polypharmacy, irrational use of antimicrobials and injectable drugs. It also shows how prescribers deviate or follow adherence to various local treatment guidelines compared to those proposed by World Health Organization(3). Irrational use of antimicrobials has been identified as a major problem in many pediatric prescription studies; this could lead to antimicrobial resistance, treatment failures and increased healthcare costs. Polypharmacy and other forms of inappropriate forms of prescribing could be extremely harmful in children because of their physiological particularities(3).

The World Health Organization (WHO) introduced indicators for investigating drug use in health facilities and have shown to reduced non-rational use of drugs since 1993(4).

The International Network for Rational use of Drugs (INRUD), in collaboration with WHO, initiated a Drug and Therapeutics Committee (DTC) with the responsibilities of regular audits of drug use within the health facility and providing advices and assistance for better prescription behaviors. In many developed countries a well-functioning DTC has been shown to be very effective in addressing drug use problems. However, in many developing countries DTCs are not yet created and in others they do not function well(1, 3, 4).

Another strategy recommended by WHO to all countries is to avail a National Lists of Essential Drugs but even if the latter is widely spread, its use rate is still low(2, 5).

A study (including both children and adults) done in three different District Hospitals in Rwanda, showed that the prescribed drugs from Essential Drug list accounts for 70.5% (6) and nationwide study is needed for generalization of the results. These results are far from those found in a similar study done in Ethiopia(7), or the neighboring country like Tanzania(8). The present study focused on drug prescription patterns in children to assess at which level Rwandan prescribers follow the WHO indicators of prescriptions.

Methods

Study design:

A retrospective, cross-sectional quantitative study design was used.

Study setting:

The study analyzed prescriptions from different Health Facilities including Tertiary, District Hospitals and Private Clinics located in Kigali Town, Rwanda, that are beneficiaries of Rwanda Social Security Board (RSSB). Kigali Town is made of 3 Districts and each District has many pharmacies that are partners of RSSB. The study was done on 6 pharmacies (2 from each district) purposively selected to have many prescriptions than others for the period of 6 months (from 1st January to 30th June 2017). Each selected pharmacy was receiving prescriptions from health facilities of all levels (Tertiary, district hospitals and private clinics). Prescriptions were collected from Rwanda Social Security Board's (RSSB) database.

Recruitment/enrolment of participants:

Inclusion criteria

Prescription encounters aged from 1 month to 15 years and attending Pediatric Out-Patient department (OPD).

Exclusion criteria

Age less than one month and more than 15 years

Prescription not fulfilling the minimum required information (Name of the patient, date, health facility and name/signature of the prescriber)

Sample size (power calculation)

World Health Organizations recommends at least Six hundred (600) encounters for a study involving drug prescription patterns. Because most of our objectives are prevalence types, sample size calculations using Kish and Leslie for cross-sectional studies: $N = Z^2P(1-P)/D^2$ show that around one thousand (1000) prescriptions were needed in this study.

Study outcomes

The outcome was to assess how drugs are prescribed to children according to WHO indicators of prescription (Number of drugs per prescription, percentage of drugs prescribed as generic, percentage of injectable, presence or not of antibiotic and percentage of drugs on essential drug list).

Outcomes measurement:

A data collection form designed by WHO was used for this study (Appendix A). Few changes were done on the form to enable collection of information regarding dosage of the prescribed antibiotic and prescriber level. This form has been used in

studies since 1993 and has found to be useful tool for such kind of research.

Data Management and analysis

Trained Personnel collected data using designed Data collection Form and they were reporting daily to the research coordinator. The Data were entered and analyzed by means of Statistical Package for the Social Sciences (SPSS) 20 spreadsheet within a password protected computer. Tables were generated using Microsoft Excel software 2016. Descriptive statistics were performed to report on drug prescriptions patterns.

Results

The results of the present study highlight the drug prescription patterns in children for the Rwanda Social Security Board (RSSB) affiliated patients.

A total number of nine hundred and eighty-two (982) prescriptions containing two thousand, three hundred and forty-one (2341) drugs were collected. Approximately a half of those prescriptions were from private hospital/clinics, another half from public hospitals. There is no sex predominance: Male 49.7% and Female: 50.3%.

Drug prescription patterns

The study results reveal that the average number of drug prescription is 2.4.

The minimum and maximum numbers of drugs per prescription as stipulated in table 1 were 1 and 5 respectively. The results showed that the generic drugs prescriptions account for 28.5% of the total drugs prescribed. The breakdown of generic drugs highlights that around 48.4% of all prescriptions do not have a generic prescription, while only 1(0.1%) have four drugs prescribed as generics.

The prescribed antibiotics accounts for 982 prescriptions, 417 (42.5%) were having at least one antibiotic prescribed while 565(57.5%) do not have the antibiotics prescription.

Injectable drugs reported 12 prescriptions equivalent to 1.2% of all prescriptions. The results on the drugs on the essentials drug list highlighted that 61.1% of the prescribed drugs were on the list.

Drugs prescription patterns

Prescriptions		Variables								
	Number of Drugs	N	%	Total	Study results	Min	Max	Sum	Mean	WHO recommendation
Drug prescribed		982				1	5	2341	2.4	
Number of drugs per prescription	1	203	20.7							
	2	361	36.8							
	3	257	26.2	2.4						1.6–1.8
	4	160	16.3							
	5	1	0.1							
	Total	982	100							
Number of drugs with generic names	0	475	48.4	0	28.5%					
	1	372	37.9	372						
	2	110	11.2	220						100%
	3	24	2.4	72						
	4	1	0.1	4						
	Total	982	100	668						
Prescriptions with antibiotics	No	565	57.5							
	Yes	417	42.5	42.5%						20-26.8%
	Total	982	100							
Prescriptions with injectable drugs	No	970	98.8	1.2%						13.4–24.1%
	Yes	12	1.2							
	Total	982	100							
Number of drugs on the EDL	0	173	17.6	0	61.1%					
	1	339	34.5	339						
	2	334	34	668						100%
	3	121	12.3	363						
	4	15	1.5	60						
	Total	982	100	1430						

Discussion

The results indicated that the average number of drugs per prescription was 2.4 which is higher than the WHO recommended range of 1.6 to 1.8. However, this is low compared to similar studies done in Nigeria, Kenya and India where a higher rate of 2.6; 2.7 and 3.4 respectively were found(3, 5, 9), But this value is high compared to studies done in three rural district hospitals in Rwanda where a mean of 1.8 per prescription was found (6). The minimum number of drugs per prescription was 1 whereas the highest number was found to be 5 and concerned only one prescription. Adherence to WHO recommendations

is encouraged to mitigate possible prescription errors that would negatively affect the health of children with immature physiological mechanisms but also to reduce the risk of drug interactions.

Our study showed that the percentage of drugs prescribed by generic names is 28.5% which is very low compared to World Health Organization target of 100% especially for developing countries like Rwanda, where prescribing brand names will be cost effective issue for the patients and may even result in not buying the drugs, increasing the risk of morbidity or mortality of the patients. In addition to being out of WHO range, our findings are much higher compared to results from studies done in two different health facilities in India where the percentages found to be 5.8% and 6.7%, even if India is one of the biggest suppliers of generic drugs in the world. Factors that were found to be associated with these low rates of prescribing generics are but not limited to: doubt about efficacy and bioavailability of generic formulations; pharmaceutical companies which claim about higher efficacy and suitability of brand and fixed drug combinations.(2, 5) Prescribing drugs with brand names does not affect the patients only because they are not cost effective but it also leads to increased quantity of expiring drugs and this can be significant enough to have an impact on the country's economy.

The percentage of encounters with an antibiotic prescribed was 42.5% which is also out of WHO recommendation of 20-26.8% and is higher compared to previous studies done in India, Rwanda and Nigeria (2, 3, 5, 6) but is low compared to results found in Italy (10).

Although the overall percentage of encounters with an antibiotic prescribed is high, results are promising when you consider only children aged 2 years and below where the percentage of prescriptions with an antibiotic was 13% because viral infections predominate in this age group.

Prescribing injections (1.2%) was found to be within WHO range and this is because most of injectable drugs are reserved for inpatient use. However, previous studies shown high rate of 13% in Nigeria and Kenya (3, 9).

The percentage of drugs prescribed from National Essential drug List (EDL) was 61.1%. This value is very low compared to WHO target of 100%. It is similar to a study done in Nigeria (3) but very low compared to previous studies done in Ethiopia and in East African community (6, 7, 9). We hypothesized that physicians in the town could be influenced by drug promoters who come to visit them with new drugs with brand names and the latter are not on the Essential drug list which is updated regularly (last update was done in 2015). This can explain also the high proportion of expiring drugs before being used. Physicians should be advised to prescribe medicines from EDL which are imported by the country therefore reducing wastage and cost spent by patients buying those expensive medicines with brand names.

This study showed that there is a big difference in prescribing behaviours between private and public hospitals: Polypharmacy, prescribing with brand names, prescribing drugs from essential drug list and antibiotic prescriptions were more observed in private hospitals/clinics than in private ones. But prescribing drugs not on the essential drug list and injectables was more seen in public hospitals. Here are some hypotheses which try to explain these observations: Private hospitals/clinics put much emphasis on patients' satisfaction and this can be associated with the fact those prescribers in private hospitals/clinics end up being influenced by parents who want rapid healing of their sick children. Another reason is that private prescribers may feel that they are not obliged to follow treatment standards and guidelines thinking that the latters concern mainly public hospitals.

Conclusion:

Findings from the present study revealed that Physicians in Kigali are performing well in areas of encounters with injection, antibiotics rate in children below two years and dosing method of prescribed antibiotic. On the other hand, many areas: number of drugs per prescription, overall antibiotic rate, prescribing generic drugs and prescribing drugs from national essential drug list were found to be far away from WHO recommendations. Measures should be put in place with close monitoring to overcome this gap. Further studies are needed to reflect the national image with WHO hospital and patients core indicators are needed to assess the magnitude of the problem.

Recommendations:

Drug prescribers should be aware of WHO core prescribing indicators so as they improve on rational use of medicines and contribute to reduction of prescribing errors.

Medical education should emphasize on prescribing patterns.

The Ministry of Health as policy organ body should avail national Essential Drug List and Standard treatment guidelines in all health facilities as they help for a good prescribing practice. Inspections should be conducted to make sure that those documents are used.

Limitations

Due to time and financial constraints our study was conducted in Kigali city only.

Declarations

Ethics approval and consent to participate

Prior to its commencement, the study was presented to Pediatric departmental meeting of the Kigali University Teaching Hospital and has been approved by Pediatric academic staff in December 2017. Then it was reviewed and approved by the University of Rwanda Institutional Review Board (IRB). (Ref: N°157/CMHS/IRB/2017) (Appendix C)

There was no consent from patients as the study used files, only prescriptions were analyzed and no name of the patient or prescriber were collected. Rather, formal authorization was obtained from RSSB authorities (Ref: No RSSB/7750/HR/16) (appendix B).

Participants confidentiality was kept by using codes rather than names of participants, in addition, prescriber and health facility were not disclosed.

Consent for publication

The researchers discussed with RSSB possibility of publication and agreement was obtained

Competing interests

All authors declare that there is no competing interest in this research

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No organizational funds were applied for this study. The researchers used their own funds.

Authors' contributions

GH: Contributed to the conception of the research idea, wrote the protocol, data collection and management and manuscript writing

TN: Contributed to data management, data analysis and manuscript writing

JCK: Contributed to the conception of the research idea, wrote the protocol, data collection and management and manuscript writing

PCK: Contributed to the conception of the research idea, wrote the protocol, data collection and management and manuscript writing

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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