# Factors Influencing Rational Drug Use in Public Hospitals among Doctors and Pharmacists in Meru County

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## Abstract

Rational use of medicines requires that patients receives affordable, right drug and dose for the adequate period of time. Irrational drug use is influenced by lack of essential drugs, lack of training and weak implementation of policies. The purpose of this study was to assess the factors that influence rational drug use among doctors and pharmacists in public hospitals in Meru County. Specific objectives were to examine how staff awareness on policy guidelines, management practices, product selection and inventory management influence rational drug use. A cross-sectional research design was adopted for this study. The sample size was 102 doctors and pharmacists in the public hospitals in Meru County. A Likert based questionnaire was used to collect data. There was a significant relationship between staff awareness ($r=.232$, $p<0.05$) and inventory management ($r=.324$, $p<0.05$) on rational drug use. Coefficient of determination (R) of 0.402 was obtained compared to overall $R^2$ of 0.162 and this explains 40.2% of total variations that explained factors that influence rational drug use among the healthcare workers in Meru County. The ANOVA findings ($p<0.05$) shows that there was correlation between the predictors variables and the dependent variable RDU. The study recommends the following to the Hospital Management Team i) to offer training on rational drug use, ii) offer support supervision and appraisals iii) Constitute active Drugs and Therapeutics Committees iv) to form procurement committee with all stakeholders to strengthen inventory management.

**Key words:** *Rational Drug Use, Rational dispensing, rational prescribing, Product selection, Inventory management*

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## Introduction

The factors that contribute to irrational drug use include lack of proper communication, misleading beliefs on potency, patient demands, prescribers lack education, lack of objective drug information, heavy patient load, pressure to prescribe, lack of adequate lab capacity, insufficient staffing, unreliable supplier systems, stock outs, expired drugs, drug regulation weakness, informal prescribers and lack of regulation enforcement. The impact is increased morbidity and mortality, increased treatment costs, adverse drug reactions and drug resistance (Duke,2012)

Availability and affordability of essential drugs are crucial for functioning of any health system (Ahmed, 2012). Rational use of drugs is fundamental to the provision of universal health coverage (UHC). Inadequate or inaccurate information about drugs and lack of standard treatment guidelines leads to improper treatment and irrational use of drug (Harper, 2011). Worldwide more than 50% of all medicines are prescribed, dispensed, or sold inappropriately, while 50% of patients fail to take them correctly. One-third of the world's population lacks access to essential medicines (Haque, 2017). In Kenya, there is gap in implementation and enforcement of policies, poor resources allocation, both financial and human. Irrational dispensing was demonstrated in 70% of public health facilities and more than three-quarters of dispensed medicines were inadequately labeled (MOH, 2003).

Internal policies at the facility level in Meru County are weak and therefore need to be reviewed and aligned. The service charters are available but they are not adhered to and the therapeutic committees in facilities do not carry out service delivery audits regularly (Meru County, 2013). There is lack of proper logistics management system, inventory control and lack of adequate storage facilities for essential drugs. The poor inventory management practices result in chronic stock out of essential drugs (Shadrack, 2015)

The main objective of this study was to assess the factors influencing rational drug use among doctors and pharmacists in Meru County and the specific Objectives were to (i) establish how staff awareness on policy guidelines influence rational drug use (ii) to determine if management practices influence rational drug use, (iii), to determine how logistics management of essential drugs influence rational drug use and (iv) to establish how inventory management affects rational drug use among doctors and pharmacists in Meru County.

## Methods

The study adopted a cross-sectional study design. This was a descriptive research and it was carried out in all the Sub County hospitals in Meru County. The target population of 138, comprised all doctors and pharmacists in Meru County. To select the appropriate sample size, we applied a proportionate stratified random sampling method. Respondents were grouped into stratus; simple random sampling was then used to get the sample size of the respondents. The respondents were 77 doctors and 25 Pharmacists resulting to a sample size of 102 respondents. Ethical clearance was sought from the relevant bodies. Data was collected using a structured questionnaire. Quantitative data analysis was done with the use of SPSS Version 23. The Mean Score and standard deviations were used to analyze the descriptive variables in this study. The results were then presented in tables, frequencies and percentages. The test statistics used were P-values, Pearson's Rho (r), mean scores, standard deviations. The study used the following functional relationship to arrive at the model that was used in this study:

$$Y=f(X_1, X_2, X_3 X_4)+ \varepsilon$$

Where Y stands for Rational drug use

$X_1$= Staff awareness

$X_2$=Management practices

$X_3$=Product selection

$X_4$=Inventory Management

ε = Stochastic disturbance error term

## Results

### Respondents' Socio-demographic characteristics.

The respondents' socio-demographic characteristics are presented in Table 1

**Table 1: Socio-demographic characteristics of respondents**

| Characteristic | Respondents N (%) |
|---|---|
| **Age of respondents (years)** | |
| Below 30 years | 31 (30.4) |
| 31-40 years | 61 (59.8) |
| 41-50 years | 5 (4.9) |
| 51-60 years | 5 (4.9) |
| Total | 102(100.0) |
| **Gender** | |
| Male | 26 (25.5) |
| Female | 76 (74.5) |
| Total | 102(100.0) |
| **Highest academic qualification** | |
| Bachelor's degree | 83 (81.4) |
| Master's degree | 19 (18.6) |
| Total | 102(100.0) |
| **Cadre** | |
| Medical officer | 69 (67.7) |
| Pharmacist | 33 (32.3) |
| Total | 102(100 |
| **Duration of experience in prescribing/dispensing** | |
| Less than 1 year | 45 (44.1) |
| 1-5 years | 25 (24.5) |
| 6-10 years | 16 (15.7) |
| More than 10 years | 16 (15.7) |
| Total | 102(100.0) |

| | |
|---|---|
| **Number of patients served per day** | |
| Less than 50 patients | 44 (43.1) |
| 50-100 patients | 49 (48.0) |
| 101-200 patients | 6 (5.9) |
| More than 200 patients | 3 (2.9) |
| **Total** | **102(100.0)** |

The analysis indicated that 61(59.8%) of the respondents were between age of 31-40 years. Those below 30 years were 31(30.4). This is consistent with the fact that majority of the doctors and pharmacists in public hospitals are young people. Those with ages 41-50 and 51-60 accounted for 5(4.9%). These were the top management. The findings on gender showed that there were more males 76(74.5%) than females 26(25.5%). This implies that the bulk of the doctors and pharmacists are of the male gender. Among the respondents, the findings as indicated in Table 1 shows that majority of the respondents were degree holders and they accounted for 76 (74.5%). Masters holders were 26(25.5%). The implication is that all the respondents were literate and were able to fill in the questionnaire appropriately and they were qualified for the positions.

## Rational Drug Use

Table 2 shows the respondents agreed that they prescribed drugs from the Essential Drug List (Mean Score 3.84) and most of the prescriptions are clear and legible (Mean Score 3.65). They disagreed that most of the prescriptions were appropriate for the diagnosis (Mean Score 2.73). Drugs dispensed were well packed and labelled with clear instructions (Mean Score 3.43)

**Table 2: Descriptive Statistics on Rational Drug Use**

| Statement | N | Mean | SD |
|---|---|---|---|
| We prescribe drugs from the essential drug list | 102 | 3.84 | 0.95 |
| Most of prescriptions are appropriate for the diagnosis | 102 | 2.73 | 1.05 |
| Most of the prescriptions are clear and legible | 102 | 3.65 | 1.06 |
| The drugs dispensed are well packed and labelled with clear instructions | 102 | 3.43 | 0.88 |
| The patients are given drug information and counselled during dispensing | 102 | 3.70 | 1.07 |
| There is follow up program in place to track patients | 102 | 2.92 | 0.97 |
| We are updated on new trends in treatment through workshops and continuous medical education | 102 | 3.52 | 1.02 |
| Patient complaints and adverse drug reactions are reported and appropriate remedy actions taken | 102 | 3.63 | 0.86 |
| Relevant investigations are carried out prior to making a diagnosis | 102 | 3.68 | 0.86 |

## Policies on Rational Drug Use

The respondents were asked questions on staff awareness on policy guidelines and the results were: majority disagreed they were aware of the RDU policies in their work place (Mean Score 3.28). They also disagreed that the policies were helpful (Mean Score 2.18). From the above results it shows that lack of awareness on policies related to Rational Drug Use is a key problem. The study shows similar results to those done by WHO (2010) that less than 40% of patients are treated according to STGs in the public sector, a figure that drops even lower in private sector settings. The findings collaborate a study done that demonstrated among the reasons for irrational drug use include lack of knowledge and skills on policy guidelines (Green, 2012)

**Table 3: Descriptive statistics on Staff awareness on guidelines**

| Statement | N | Mean | SD |
|---|---|---|---|
| I am aware of rational drug use policies that are in place | 102 | 3.28 | 1.11 |
| The policies are helpful in my work | 102 | 2.16 | 1.41 |
| Policies are clear, unambiguous and concise | 102 | 3.57 | 1.32 |
| Standard operating procedures displayed | 102 | 2.94 | 1.28 |
| Majority of the staff implement the standard operating procedures | 102 | 3.02 | 1.15 |
| I have a copy of the standard treatment guidelines and essential drug list | 102 | 2.97 | 1.25 |
| I often use the Standard Treatment Guidelines for reference | 102 | 3.83 | 1.23 |
| The Standard Treatment Guidelines are helpful source of information | 102 | 3.84 | 1.15 |

## Influence of Management related practices on Rational Drug Use

The study sought to establish the role of management on rational drug use (Table 4)

**Table: 4: Descriptive statistics on Management related practices**

| Statement | N | Mean | SD |
|---|---|---|---|
| I have a supervisor whom I report to in the course of my work | 102 | 3.52 | 1.16 |
| The supervisor is always available for consultation | 102 | 3.51 | 1.19 |
| The supervisor often gives valuable feedback | 102 | 3.04 | 1.23 |
| Majority of the staff feel that the supervision is adequate and builds capacity | 102 | 2.93 | 1.08 |
| I have attended training(s) on Rational Drug Use | 102 | 3.01 | 1.08 |

| | | | |
|---|---|---|---|
| The training was informative and educative | 102 | 2.44 | 1.05 |
| New staff are taken through an induction training on rational drug use as part of orientation process | 102 | 2.75 | 1.30 |
| We have an active drug and therapeutics committee | 102 | 2.68 | 1.26 |
| I have participated in drug and therapeutic committee Meetings | 102 | 2.86 | 1.16 |
| The drug and therapeutics committee has developed a hospital formulary which is reviewed periodically | 102 | 2.87 | 1.02 |

## Supervision

The respondents agreed that they had a supervisor whom they reported to in the course of their work (Mean Score 3.52) and the supervisor was available for consultation (Mean Score 3.50) They disagreed that supervision was adequate and built capacity (Mean Score 2.93) and thus more supervisors are needed to oversee healthcare provision and any guidance that should be needed as motivated staffs are more likely to deliver a higher quality of healthcare service (MSH, 2010)

## Training

The study found out that most of the respondents disagreed that they had attended trainings on Rational Drug Use (Mean Score 3.01). The study agreed with a similar study that majority of inventory management staff did not have adequate training on supply chain management (Shadrack, 2015).

## Drug and therapeutics committees

The respondents disagreed that they had an active Drugs and Therapeutics Committee (Mean Score 2.67). They also disagreed to have participated in Drugs and Therapeutics Committee meetings (Mean Score 2.86). The results concur with similar study that less than half of all countries have medicine information centre for prescribers or drug (medicine) and therapeutics committees (MOH 2013)

## Product selection

Product selection is important to ensure availability of essential drugs. Products selected must be of good quality. All stakeholders should participate in drug selection. The results are presented in Table 5

**Table 5: Descriptive statistics on Product selection**

| Statement | N | Mean | SD |
|---|---|---|---|
| I have participated in medicines/product selection in Consultation with other stakeholders | 102 | 3.96 | 1.01 |
| Quality of products is considered in when carrying out product selection | 102 | 3.73 | 1.19 |
| The products selected are from the essential drug list | 102 | 3.69 | 1.03 |

| | | | |
|---|---|---|---|
| I am engaged in the quantification of drugs | 102 | 3.98 | 1.03 |
| We use consumption data to forecast drugs to procure | 102 | 3.59 | 1.13 |
| Past performance, quality and ability to meet delivery schedules are factors we consider prior to procuring | 102 | 3.91 | 1.06 |
| The procurement period from one to the next is well defined | 102 | 2.93 | 0.98 |
| We have a procurement committee to carry out prequalification of suppliers | 102 | 3.09 | 0.97 |

## Selection of Essential Drugs

The respondents agreed to have participated in medicines/product selection in consultation with other stakeholders (Mean Score 3.96). They also agreed that products selected were from the Essential Drug List (Mean Score 3.69). Similar studies have shown that in Kenya in 2008, drugs accounted for 14% of the health budget and one of the areas targeted was to improve essential drug supply particularly in selection and quantification, (MOH, 2017).

## Quantification of Essential Drugs

The respondents agreed that consumption data was used to forecast drugs to procure (Mean Score 3.59). They also agreed that they were actively engaged in the quantification of drugs to enable planning and budgeting (Mean Score 3.98). Similar studies have shown that there is need to improve essential drug supply in selection and quantification (MSH, 2010).

## Inventory Management.

Availability of essential medicines is commonly cited as the most important element of quality by health care consumers, and the absence of medicines is a key factor in the underuse of government health services. Results on Inventory management are presented in the Table 6 below.

**Table 6: Descriptive statistics on Inventory Management**

| Statement | N | Mean | SD |
|---|---|---|---|
| Drug store is secure to prevent theft and unauthorized access | 102 | 3.98 | 0.93 |
| We have cold storage for commodities that are required | 102 | 2.80 | 1.14 |
| There is enough storage space for drugs | 102 | 3.42 | 1.10 |
| Staff know the rules of disposing expired and damaged drugs | 102 | 3.97 | 1.06 |
| Staff verify orders received against the orders placed | 102 | 2.93 | 0.97 |
| We carry out monthly stock counts | 102 | 3.45 | 0.95 |
| We have stock/bin cards for the control of stocks | 102 | 3.76 | 0.96 |
| The bin cards are up to date and correctly filled | 102 | 2.89 | 1.02 |

The respondents reported in agreement that drugs stores were locked (Mean Score 3.98). However, the bin cards were not up to date and correctly filled (Mean Score 2.89). Inventory control reports on stock management are useful sources of information for monitoring (WHO, 2011a).

## Inferential Statistical Analysis

This analysis was set to determine whether each of the independent variables in the study that is, staff awareness ($X_1$), Management practices ($X_2$), Product selection ($X_3$) and Inventory management ($X_4$) influences Rational Drug Use (Y). The results for each variable in this study are given by the Spearman's Rho (r) and its corresponding *p-value.*

**Table 7: Bivariate Linear Correlation: All Variables**

| | | RDU | Staff awareness | Management practices | Product Selection | Inventory Mgt |
|---|---|---|---|---|---|---|
| RDU | Pearson Correlation | | | | | |
| | Sig. (2-tailed) | | | | | |
| staff awareness | Pearson Correlation | .232* | | | | |
| | Sig. (2-tailed) | .019 | | | | |
| Management practices | Pearson Correlation | .136 | .045 | | | |
| | Sig. (2-tailed) | .173 | .654 | | | |
| Product Selection | Pearson Correlation | .134 | .014 | .236* | | |
| | Sig. (2-tailed) | .179 | .893 | .017 | | |
| Inventory Mgt | Pearson Correlation | .324** | .092 | .145 | .067 | |
| | Sig. (2-tailed) | .001 | .359 | .147 | .505 | |

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

The results of the Pearson's product moment correlation analysis as presented in Table 7 show varied degrees of interrelationships. The results suggested that staff awareness and inventory management influence rational drug use. Staff awareness (X1) was statistically significantly correlated with rational drug use ($r=.232$, $p<0.05$). This implies that any improvement in staff awareness results in improvement of rational drug use. The null hypothesis that there was no influence of staff awareness on rational drug use was rejected. Results showed there was a statistically significant relationship between staff awareness and rational use of drugs.

Similarly, inventory management factors (X4), are statistically significantly correlated with rational drug use (r=.232, p<0.05). This means that adherence to inventory management requirements enhances rational drug use. The null hypothesis that there was no influence of inventory management on rational drug use was rejected. Results showed there was a statistically significant relationship between inventory management and product selection on rational use of drugs by doctors and pharmacists in Meru County was not rejected.

**Table 8: Rational Drug Use: ANOVA**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 253.857 | 4 | 63.464 | 4.684 | .002[b] |
| | Residual | 1314.143 | 97 | 13.548 | | |
| | Total | 1568.000 | 101 | | | |

a. Dependent Variable: Y

b. Predictors: (Constant),$X_1$ $X_2$, $X_3$, $X_4$

A multiple regression analysis was performed on the four principal factors (Staff awareness, Management practices, Product selection and Inventory management) to test their combined influence on Rational drug use among doctors and Pharmacists working in Public Hospitals in Meru County. The regression output was varied as indicated in Table 8, ($F_{(4,97)}$ =4.64, p<0.05) shows that there is correlation between the predictors variables (Inventory Mgt, product selection, staff awareness, management practices) and the dependent variable Rational drug use.

**Table 9: Rational Drug Use Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .402[a] | .162 | .127 | 3.68074 |

a. Predictors: (Constant), $X_1$, $X_2$, $X_3$, $X_4$

The results of the regression analysis in Table 9 above indicates significant influences of the factors that affect rational drug use as presented in the model summary, within the variables, coefficient of determination (R) of 0.402 was obtained compared to overall $R^2$ of 0.162 and this explains that 40.2% of total variations that explained factors that influence rational drug use among the healthcare workers in Meru County. The standard error of estimate (3.68074) shows the average deviation of the independent variables from the line of best fit.

**Table 10: Rational Drug Use: Regression Coefficients**

| Model | | Unstandardized Coefficients B | Std. Error | Standardized Coefficients Beta | t | Sig. |
|---|---|---|---|---|---|---|
| 1 | (Constant) | 8.524 | 3.994 | | 2.134 | .035 |
| | Staff awareness | .144 | .067 | .201 | 2.151 | .034 |
| | Management practices | .056 | .086 | .062 | .644 | .521 |
| | Product selection | .109 | .107 | .097 | 1.019 | .311 |
| | Inventory Management | .358 | .117 | .290 | 3.072 | .003 |

a. Dependent Variable: RDU

From the regressions coefficients results, this study found statistical and significant evidence that Staff awareness on policies, management practices, product selection and inventory management, in a combined relationship, positively and significantly influence rational drug use among doctors and pharmacists in public hospitals in Meru County.

## Discussion

### Rational Drug Use

It was established that relevant investigations were carried out prior to making a diagnosis (Mean Score 3.68) and the patient complaints and adverse drug reactions were reported, appropriate remedy actions taken (Mean Score 3.63). Staff were updated on new trends in treatment through workshops (Mean Score 3.53). These findings agreed with Syed, (2012) that rational use of drugs requires patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community (Syed, 2012).

## Influence of Staff Awareness on Guidelines

Respondents disagreed that policies were helpful (Mean Score 2.18). From the results it shows that lack of awareness on policies related to Rational Drug Use is a key problem. The study shows similar results to those done by WHO (2010) that less than 40% of patients are treated according to STGs in the public sector, a figure that drops even lower in private sector settings. The findings concur that among the reasons for irrational drug use include lack of knowledge and skills on policy guidelines (Green, 2012).

### Influence of Management related practices on Rational Drug Use

Most facilities did not have active drugs and therapeutics committees. The results concur with similar study that less than half of all countries have medicine information centre or drug and therapeutics committees in most of their hospitals (WHO 2011b) and (MOH 2013). It may be worthwhile for these committees to be constituted and develop formularies.

**Influence of Product Selection on Rational drug use**

The respondents agreed forecasting, past performance, quality and ability to meet delivery schedules were factors we consider prior to procuring (Mean Score 3.91). They disagreed that procurement period cycle defined (Mean Score 2.93)**.** When the drug selection is inefficient there is purchase of too many products, unnecessarily expensive products, inappropriate products and inappropriate quantities (Kenya Essential Drug List, 2002).

## Inventory Management.

The respondents disagreed that there were cold storage facilities (Mean Score 2.80). They also disagreed that bin cards were up to date and correctly filled (Mean Score 2.89). These findings are consistent with a survey by WHO in 39 low and middle income countries including Kenya established that there was a wide variation on the availability of essential drugs which was at 20% in public sector and 56% in private sector, (WHO, 2010) the extent to which inventory management practices contributes to the variation in availability.

## Conclusion

The study found that staff awareness had significant influence on rational drug use. This implies that staff awareness contributes significantly to rational drug use among doctors and pharmacists in Meru County. The study established that, there was no significant relationship between management practices and rational drug use in Meru County. This implies that adherence to management practices does not enhance rational drug use by doctors and pharmacists in Meru County.

The study found that there was no significant relationship between product selection and rational drug use. This means that adherence to product selection does not enhance rational drug use. The study revealed that there is statistically significant influence of inventory management on Rational drug use. Inventory management factor contributes significantly towards rational drug use in Meru County.

The study recommends that hospital management teams i) to develop training manuals and offer training on rational drug use, ii) to offer supportive supervision and appraisals on rational drug use, iii) to constitute and make operational Drugs and Therapeutics committee and ensure hospital formularies are developed, iv) to constitute procurement committee with all stakeholders in the budgeting, selection, ordering and monitoring the use of Essential drugs.

**Competing interests**

The authors declare that they have no competing interests

**Authors Contributions**

Dennis M. Wahome conceptualized the study. All authors contributed to study design and data analysis. All the authors reviewed and approved the final version of the publication manuscript.

## References

Ahmed,S,M. (2012). Availability and Rational Use of drugs in Primary Healthcare Facilities.*Journal of health Population and Nutrition* 30(1), 99–

108

Duke, M. (2012). *Towards sustainable Supply and Rational Use of Drugs.* Retrieved from http://www.thaidrugwatch.org/download/2.4%20reading%20managing%20drug%20supply%20chapter%201.pdf

Green, T. (2012). Startegies to improve the use of medicines. *Rational Pharmaceutical Management Plus Program* , 31.

Haque, M. (2017). Essential Medicine utiization and Situation in Selected 10 developing Countries. *Journal of International Society of Preventiveness and Community Dentistry* 7(4),147-160.

Meru County. (2013). *Meru County Integrated Develpment Plan.* Meru: Meru County Government.

MOH. (2003). *Assessment of the Pharmaceutical situation in Kenya. A baseline Survey.* Nairobi: Ministry of Health.

MOH. (2013). *Guidelines for Medicine and Therapeutic Committee.* Nairobi: G.O.K.

MOH. (2017). *Health Sector Working Group Report.* Nairobi:MOH

MSH. (2010). *Health Systems in Action.* Management Sciences for Health.

Shadrack, D. C. (2015). Inventory Management Practices for Essential drugs at Public and Mission Hospitals in Meru County, Kenya. *International Journal of Current Business and Social Sciences* 1(4),77-103.

Syed, A. (2012). A study on Rational Drug Prescribing pattern in Geriatric patients in Hyderabad Metropolitan. *Journal of Drug Delivery and Therapeutics* 2(5),109-113.

WHO. (2010). *Rational use of Medicines Fact Sheet.* Geneva: WHO Press

WHO. (2011a). *Harmonized Monitoring and Evaluation for procurement and supply management system.* Geneva: WHO publications.

.

WHO. (2011b). *The World Medicine Situation.* Geneva: WHO Press.