Investigations into Medication Related Problems and Interventions in Self Medication with Antibiotics and Analgesics in Freetown

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Abstract- **Background:** There is a lot of public and professional concern about the irrational use of drugs and so this topic is of significant public and professional interest. MRPs are a significant but avoidable (at least to a certain extent) source of patient morbidity and mortality. Identifying these problems, their causes and the impact and influence of professional interventions, will be of significant benefit to the patient and the health care delivery system and the optimization of pharmaceutical care and therapeutic outcomes.

Most medication related problems can be avoided and community pharmacies, as well as hospital pharmacies are assuming an active role in preventing and intervening in medication related problems.

Objective: to investigate Medication Related Problems (MRPs) in self medication with antibiotics and analgesics and the impact of interventions in handling the problems encountered.

Method: The study covered 6 selected community pharmacies and one government hospital pharmacy in Freetown and was done using the Pharmaceutical Care Network of Europe (PCNE) Classification System as instrument. The classification is for use in research into the nature, prevalence, and incidence of MRPs and also as a process indicator in experimental studies of Pharmaceutical Care outcomes. It is also meant to help health care professionals to document MRP-information in the pharmaceutical care process.

Results: Medication related problems in self- medication with analgesics andantibiotics were common amongst formally educated (48 %) and informally educated (illiterate patients) (52%)percent .However ,educational level ,age and sex as combined factors influenced the awareness of health and diseases of patients. Interventions by Pharmacy professionals can significantly reduce mrps and the morbidity and in less often cases mortality usually associated with these mrps.

Conclusion: It was concluded from the study that MRPs abound in self-medication even amongst educated people, but the availability of health care professionals who are ready to render pharmaceutical care and counselling can significantly minimize the occurrence.

Index Terms- Self-medication ,antibiotics ,analgesics ,Medication Related Problems

I. INTRODUCTION

Medication related problems are the undesirable events experienced by patients that involve or is suspected to involve drug therapy and actually or potentially interferes with a desired patient outcome.[1] Medication related problems include the following: Failure to receive medication, over dosage, improper medicines indication, untreated indication, sub-therapeutic dose, drug interactions, adverse drug reactions, drug use without indication. In general, problems related to the use of approved drugs can be summarised with the term, "medicines related problems". Medication Related Problems (MRPs) or Drug Related Problems (DRPs) are common and can be identified and minimised with the right pharmaceutical care approach as well as proper structures to identify medication related problems and intervene appropriately. Most medicines related problems are avoidable and community pharmacies are assuming an active role in preventing and solving medicines related problems.[2] There is a lot of public and professional concern about the irrational use of drugs. The easy availability of a wide range of drugs, the inadequate health services in some countries, has resulted in an increased proportions of drugs used for self medication compared to prescribed drugs[3]

Although, over the counter drugs (OTC) are meant for self medication and are of proven efficacy and safety, their improper use due to lack of knowledge of their side effects and interactions could have serious implications, especially in extremes of ages (children and old age) and special physiological conditions like pregnancy and lactation[4] and in cases of concomitant diseases wherein one medication useful for one condition may be contraindicated in another e.g. hypertension and asthma.

While a relatively small percentage of people consult the pharmacist about an episode of minor illness, the numbers involved are large, with an average of about 10 people seeking advice about symptoms in each community pharmacy every day[5] for symptoms which may range from pain to skin disease, and from travel advice to homeopathy. Thus, community pharmacies undoubtedly see many initial presentations of illness and are a key gateway for triage and referral to other sources of advice. Criteria have been identified to assess the appropriateness of advice-giving by community pharmacists and their staff. [6]

A recent UK evaluation of a community pharmacy guideline shows that, in fact, pharmacists probably already have the knowledge covered by the guidelines and that failure always

to apply the rigid requirements of the OTC license [7] may be due to other factors. These may include professional judgement, patient pressure, and doctor recommendations. In response to a perceived conflict between guideline content, patient preference, and their own professional experience, pharmacists may, however, pragmatically decide on a different management strategy.[8] Studies with community pharmacists in Australia indicate that perceived clinical effectiveness, personal and customer experience, manufacturer support, and commercial factors all play a part. Concern has been expressed that pharmacists and their assistants in developing countries recommend 'prescription' medicines for OTC use (e.g. antibiotics for diarrhoea or cough) and there is evidence that this occurs. [9,10] There is undoubtedly variation in the extent to which the law relating to medicines is enforced or not in different countries as well as in the extent to which pharmacists adhere to guidelines.

The prevalence of self-medication with antibiotics is quite high in developing countries as opposed to developed countries In a study conducted to ascertain the prevalence of self-medication with antimicrobial agents among patients attending a clinic for treatment of sexually transmitted diseases (STDs) [11], questionnaires were administered to and urine samples collected for antimicrobial testing from 551 patients before treatment. Self-medication was defined as an antimicrobial agent taken on the patient's own initiative by self-report during the week before the visit to the clinic or a positive urine assay for antimicrobial agents at the time of the clinic visit. Urine was tested for the presence of antimicrobial agents by a disk diffusion method using *Sarcinalutea* as the test organism. A total of 75(14%) of the 551 participants were self-medicators: 19 reported antimicrobial use and had a positive urine test, 27 reported antimicrobial use but had a negative urine test, and 29 denied antimicrobial use but had a positive urine test. Thus, 29 (60%) of the 48 patients with antimicrobial agents detected in their urine at the time of the clinic visit denied self-medication. Self-medicators acquired their antibiotics either from their medicine cabinet (44%) or from a family member or friend (56%). It was concluded that use of unprescribed antimicrobial agents (usually β-lactam agents or tetracyclines) among STD clinic attendees in this study was common and that self-reporting was not a reliable method of screening for self-medicators.

In a Scottish survey of community pharmacists, 70 per cent said they believed OTC products were being misused, including antihistamine containing sleep aids, codeine preparations, cough medicines, stimulant cold remedies, and laxatives.[12] Pharmacists reported reasons for their suspicions as being unexpected increased turnover, individual excessive requests, and suspicious appearance. Professional concerns mean that they tried to manage the situation by suggestions to visit a doctor if symptoms did not improve, keeping a record of sales, refusing sales, and not stocking certain products. Nonetheless, they are frustrated by their lack of control over the situation as if people really want to purchase something they can always try elsewhere. These findings have been confirmed by other surveys, which also concluded that pharmacists feel that the issue should be addressed in a structured way with national guidelines on management. [13] Conversely, recent research on codeine-containing analgesics in Finland did not support the view that widening access to medicines liable to misuse would increase usage. [14]

A study was conducted in 2005 in Germany to identify the spectrum of MRPs encountered in community pharmacies. Median time needed for solving a MRP was 5 minutes. It was concluded that Pharmacists in the community pharmacy setting are well suited to identify and resolve MRPs. That ensuring the proper use of both prescription and OTC drugs is one of the basic responsibilities of pharmacist sand that this specific role of pharmacists within the healthcare system needs to be more fully recognized. A similar conclusion was made in a study done in six French hospitals to investigate amongst others, the impact clinical pharmacist had in preventing MRPs [15] – that pharmacist significantly to preventing MRPs including those from prescriptions.

Many older adults self-medicate their osteoarthritis pain with OTC NSAIDs even though inflammation is not characteristic and acetaminophen is recognized as the drug of choice in treating osteoarthritis.[16,17] Individuals with hypertension should be encouraged to use acetaminophen for pain and fever. Chronic NSAID use (other than daily low-dose aspirin) increases blood pressure in both normotensive and untreated hypertensive individuals. Additionally, NSAID use has been found to counteract the antihypertensive effects of thiazide diuretics, beta-blockers, alpha-blockers, and angiotensin converting enzyme inhibitors. [18,19]

The study done by Stosic et al [20] demonstrated that since ibuprofen has become available outside the pharmacy setting in Australia fewer people are using NSAIDs appropriately according to the label; compared to 2001, in 2009 10.2% more regular OTC analgesic users were using ibuprofen despite having contraindications, warnings, precautions or potential drug-interactions. A similar situation can be expected in Sierra Leone, availability of analgesics and even antibiotics with pedlars, in business enterprises and non-pharmacy outlets significantly increases the risk of abuse, misuse and medication related problems. Continued effort to raise consumer awareness and to facilitate more informed individual treatment choices is warranted. Healthcare professionals continue to play an important role by proactively probing patients about the use of OTC medications, particularly when a new diagnosis has the potential to impact on patients' choice of such medicine.

II.   METHODOLOGY

This study was done using the Pharmaceutical Care Network of Europe (PCNE) Classification System as instrument.

The classification is for use in research into the nature, prevalence, and incidence of MRPs and also as a process indicator in experimental studies of Pharmaceutical Care outcomes [21] it is also meant to help health care professionals to document   MRPs-information in the pharmaceutical care process.

The hierarchical classification is based upon similar work in the field, but it differsfrom existing systems because it separates the problems from the causes. The following definition is the basis for the classification:

The basic classification now has 6 primary domains for problems –that is the main categories of medication related

problems, 6 primary domains for causes-that is the main categories or main domains of the causes of these medication related problems, and 5 primary domains for Interventions –that is attempts to reverse or minimize the MRPs by health care professionals and 3 primary domains for outcomes- that is the outcomes of the interventions, whether they were successful or not and to what extent.

However, on a more detailed level there are 21 grouped sub domains for problems, 33 grouped sub domains for causes and 17 grouped sub domains for interventions. The fourth primary domain is the outcomes which are subdivided into 4 sub-domains.

Those sub domains can be regarded as the finer distinctions of the generalized problems or main domains

The age, sex and level of education of the patient were also recorded, along with the medication requested by the patient and the indication for which he/she requested it for.

Ethical approval was obtained from the Research Ethics Committee of the College of Medicine and Allied Health Sciences – Freetown. In each case the consent of the respondent was obtained Patient's age, sex but not names were recorded and other ethical protocols were observed.

Of the 352 subjects that whose participation was sought 282 consented to participate with the documentation and counseling, with a total of 80 people refusing to participate in the research. Therefore a convenience sample size of 282 respondents was used in the study.

The study was conducted in six community pharmacies and one government hospital pharmacy.

Research assistants were trained in the use of the research instruments and counselling. A significant number of respondents were interviewed and counselled by the Researcher. Respondents were interviewed counselled and questioned by the Researcher and Research assistants. The data obtained were recorded by the Researcher and assistants not by the respondents. These pharmacies (hospital and private) had trained professionals who were trained in the use of the research instrument and counselling of patients as well as in suitable interventions.

Sampling: Random sampling in 7 different pharmacies (one a hospital pharmacy) a with a total sample size of 280 based on studies in medication related problems and self-medication.

A sample of 282 respondents was taken using convenient sample method. Community pharmacies were selected on the basis of location- within the central business district or as close to the central business district as possible because these were the pharmacies that had the highest number of people requesting medications for self medication – busy pharmacies. One of the research assistants served as a pharmacy professional in tune of these pharmacies in the morning hours and was part of the afternoon pharmacy staff at the government hospital involved in this study.

When a patient requested for an antibiotic /analgesic ,he or she would then be asked questions to first of all identify any medication related problems – these questions were included – what do you want to use it for ,at what dosage ,for how long ,would you be taking it along with any other medication ,if yes what other medication. Have you been taking this medication before? If yes did you experience any adverse effect?

These questions would identify medication related problems. At this point the researcher would then request the consent of the respondent. If the respondent consents, it will be documented using the consent form and the counselling continued to ascertain age, and the possible causes of the problems, for which there is also a section in the researcher instrument. All of this information would be documented and the research instrument filled.

The phone number of the patient will be noted and he/she will be followed up by means of a phone call within 4- 7 days depending on the medication /indication to ascertain, outcome of intervention

III.   RESULTS

In this section, data collected were analysed and presented. .Analysis was done with reference to the objectives of the study. A total number of 282 respondents were involved.

Demographic Characteristics of respondents
Tables 1, 2 and 3 below present the demographic characteristics of the respondents

Table 1: Total Respondent by type of Medication and Sex

Medication	Sex					
	Male		Female		Total	
	No	%	No	%	No	%
Antibiotic	69	47.6	76	52.4	145	51.4
Analgesics	73	56.2	57	43.8	130	46.1
Both	5	71.4	2	28.6	7	2.5
Total	**147**	**52.1**	**135**	**47.9**	**282**	**100**

Source: Survey data, 2013

Table 2: Average Age of Respondents (Patient) by Medication

Medication	Mean Age	Median Age
Antibiotic	33.8	32.0
Analgesics	39.6	38.0
Both	40.1	35.0
Total	**36.7**	**35.0**

Source: Survey data, 2013

Table 3: Percentage distribution of patients by age group

Age group	Frequency	Percent
15-19	8	2.8
20-24	29	10.3
25-29	55	19.5
30-34	44	15.6
35-39	44	15.6
40-44	43	15.2
45-49	17	6.0
50-54	11	3.9

55-59	5	1.8
60-64	21	7.4
65-69	2	0.7
70-74	3	1.1

Total	**282**	**100**

Source: Survey data, 2013

Table 4 Distribution of Medication type by age and sex

Drug Type	Sex		Age group													Total
	M	F	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	
Antibiotic	69	76	3	19	29	32	25	21	7	4	0	4	0	1	145
Analgesics	73	57	5	10	24	11	18	21	9	7	5	17	2	1	130

Source: Survey data, 2013

Figure 1: Percentage distribution of educational level of patients

Table 5: Percentage distribution of type of Medication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Antibiotic	145	51.4	51.4	51.4
	Analgesics	130	46.1	46.1	97.5
	Antibiotic & Analgesics	7	2.5	2.5	100.0
	Total	282	100.0	100.0	

Analysis of Primary Domains of the Problem, causes, intervention and outcomes

Analysis of the problem

Table 6*: Percentage distribution of   medication related problems in the Primary Domain

Primary Domain	Frequency	Percentage
Adverse Reaction	33	11.7
Drug Choice Problem	214	75.9
Dosing Problem	147	52.1
Drug use Problem	42	14.9
Interaction	9	3.2
Others	150	53.2

Table 7*: Percentage distribution of Causes of medication related problems in the primary domain

Primary Domain	Frequency	Percent
Drug/Dose Selection (C1)	264	93.6
Drug use Process (C2)	182	64.5
Information (C3)	233	82.6
Patient/Psychological (C4)	42	14.9
Pharmacy/Logistics (C5)	6	2.1
Other (C6)	1	0.4

Table 8*: Percentage distribution of Interventions in medication related problems –primary domain
Primary Domain

Primary Domain	Frequency	Percent
At Prescriber Level	1	0.4
At Patient/Carer Level	268	95.0
At Drug Level	254	90.1
Other Intervention	0	0.0

This study was not focused on prescriptions, however there was a case where a "prescription" written on paper was recommended by a non medical, health care hospital worker- (ward attendant) and she had to be informed of the MRPs and advice.

Analysis of Outcome of Intervention

Table 9: Percentage distribution of Outcome of Intervention in medication related problem -primary domain

Primary Domain	Frequency	Percent
Outcome intervention unknown	75	26.6
Problem totally solved	184	65.2
Problem Partially solved	19	6.7
Problem not solved	1	1.4

Analysis of Sub-Domains of Problems, causes, Interventions and Outcomes

Table 10: Percentage distribution of medication related problem- sub- domain

Sub-domain	Frequency	Percent
Side effect suffered (non-allergic)	19	6.7
Side effect suffered (allergic)	6	2.1
Toxic effect suffered	9	3.2
Inappropriate drug (not most appropriate for indication)	182	64.5
Inappropriate drug form (not most appropriate for indication)	32	11.3
Inappropriate duplication of therapeutic group or active ingredient	25	8.9

Contra-indication for drug (incl. pregnancy or breastfeeding	15	5.3
No clear indication for drug use	42	14.9
No drug requested but clear indication	17	6.0
Drug dose too low or dosage regime not frequent enough	46	16.3
Drug dose too high or dosage regime too frequent	51	18.1
Duration of treatment too short	71	25.2
Duration of treatment too long	2	0.7
Drug not taken/administered at all	1	0.4
Wrong drug taken/administered	43	15.2
Potential Interaction	8	2.8
Manifest Interaction	5	1.8
Patient dissatisfied with therapy despite taking drug(s) correctly	30	10.6
Insufficient awareness of health and diseases (leading to future problem)	133	47.2
Unclear Complaints. further clarification necessary	11	3.9
Therapy failure (reason unknown)	1	0.4

Table 11: Percentage distribution of Outcome of Intervention in medication related problems- sub-domain

Sub-domain	Frequency	Percent
Outcome Intervention unknown	76	27.0
Problem totally solved	185	65.6
Problem partially solved	17	6.0
Problem not solved, lack of cooperation of Patient	3	1.1
Problem not solved, lack of cooperation of Prescriber	0	0.0
Problem not solved, intervention not effective	1	0.4
No need or possibility to solved problem	0	0.0

Analysis of MRPS in antibiotics as compared to analgesics

Table 12: Ratio of MRPs: antibiotics: analgesics

Ratio of MRPS antibiotic: analgesics	Frequency	Ratio of MRPS analgesics: antibiotic	Frequency
Antibiotic	145	Analgesics	130
Analgesics	130	Antibiotic	145
Ratio	**1.115384615**	**Ratio**	**0.896552**

Source: Survey data, 2013

Table 13: Frequency and percentage distribution of medication related problems in self –medication: antibiotics compared to analgesics

Medication Type		Drug Related Problems(Main domain)					
		P1	P2	P3	P4	P5	P6
Antibiotic	NO	14	109	85	23	6	85
	%	42.4	50.9	57.8	54.8	66.7	56.7
Analgesics	NO	19	99	59	14	3	61
	%	57.6	46.3	40.1	33.3	33.3	40.7
Antibiotic & Analgesics	NO	0	6	3	5	0	4
	%	0.0	2.8	2.1	11.9	0.0	2.6
Total	NO	33	214	147	42	9	150
	%	100	100	100	100	100	100

Source: Survey data, 2013

Table 14: Frequency and percentage distribution of causes of medication related problems in Self medication- antibiotics compared with analgesics

Medication Type		Drug Related Causes(Main domain)					
		C1	C2	C3	C4	C5	C6
Antibiotic	NO	136	97	124	28	5	0
	%	51.5	53.3	53.2	66.7	83.3	0.0
Analgesics	NO	121	81	103	13	1	1
	%	45.8	44.5	44.2	31.0	16.7	100
Antibiotic & Analgesics	NO	7	4	6	1	0	0
	%	2.7	2.2	2.6	2.3	0.0	0.0
Total	**NO**	**264**	**182**	**233**	**42**	**6**	**1**
	%	**100**	**100**	**100**	**100**	**100**	**100**

Table15: Frequency and percentage distribution of Interventions in medication related problems-antibiotics compared to analgesics

Medication Type		Drug Related Intervention(Main domain)			
		I1	I2	I3	I4
Antibiotic	NO	0	137	123	0
	%	0.0	51.1	48.4	0
Analgesics	NO	1	124	124	0
	%	100	46.3	48.8	0
Antibiotic & Analgesics	NO	0	7	7	0
	%	0.0	2.6	2.8	0
Total	**NO**	**1**	**268**	**254**	**0**
	%	**100**	**100**	**100**	**0**

Table 16: Frequency and percentage distribution of Outcomes of Interventions in medication related problems, antibiotics compared to analgesics.

Drug Type		Drug Related Outcome of Intervention(Main domain)			
		O0	O1	O2	O3
Antibiotic	NO	52	82	7	4
	%	69.3	44.6	36.8	100
Analgesics	NO	21	98	11	0
	%	28.0	53.3	57.9	0.0
Antibiotic & Analgesics	NO	2	4	1	0
	%	2.7	2.1	5.3	0.0
Total	NO	75	184	19	4
	%	**100**	**100**	**100**	**100**

Table 17: Frequency distribution of selected variables of respondents on medication related problems

	N	Mean	SD	t-value	F-value
Sex	282	1.48	.500	49.621	
Male	147	1.00	.000	**t** cannot be computed SD=0	
Female	135	2.00	.000	**f** cannot be computed on	
					Single variable
Medication	282	1.51	.548	46.629	
Antibiotic	145	1.00	.000		
Analgesic	130	2.00	.000	t value cannot be computed SD=0	
Both	7	3.00	.000		

Age	282	36.67	12.077	50.994
15-24	37	21.9	2.623	49.139
25-34	99	29.16	2.709	107.091
35-44	87	38.91	2.726	133.109
45-54	28	48.86	3.039	85.058
55-64	26	60.54	1.816	169.966
65-74	5	68.80	2.775	55.444
Educational Status	282	1.52	.500	51.049
Formal	282	0.48	.500	16.064
Not Formal	282	0.52	.500	17.492
Indication for drug use				

Table 18: Frequency distribution of medication related problems, causes, interventions and outcomes in the primary domains

VARIABLES	N	Mean	SD
Drug related problems (DRP)			
Adverse drug reactions	282	1.88	.322
Drug choice	282	1.24	.429
Dosing	282	1.48	.500
Drug use	282	1.85	.357
Drug interactions	282	1.97	.176
Causes of DRP			
Drug/Dose selection	282	1.06	.245
Drug use process	282	1.35	.479
Drug information	282	1.17	.380
Patient/Psychological	282	1.85	.357
Pharmacy/logistics	282	1.98	.145
Other causes	282	2.00	.060
Levels of intervention			
Prescriber level	282	2.00	.060
Patient/Carer level	282	1.05	.218
Drug level	282	1.10	.300
Other interventions	282	2.00	.000
Outcome of intervention			
Unknown	75	1.00	.000
Problem totally solved	184	1.00	.000
Problem partially solved	19	2.00	.000
Problem unresolved	4	3.00	.000

Table 19: Frequency distribution of specific items in the sub-domains of MRPs

Subdomains	Frequency (%)
Adverse Drug Reactions	
• Side effect suffered (non-allergic)	19 (6.7)
• Toxic effect suffered	9 (3.2)
Drug Choice Problem	
• Inappropriate drug	182 (64.5)
• Inappropriate drug form	32 (11.3)
• Duplication of therapeutic group	25 (8.9)
• Contra-indication	15 (5.3)
• No clear indication for use	42 (14.9)
• No drug prescribed but clear indication	17 (6.0)
Dosing problem	
• Inappropriate dose regimen too low	46 (16.3)
• Drug dose too high	51 (18.1)

• Duration of treatment too short	71 (25.2)
Drug Use problem	
• Wrong drug taken/administere4d	43 (15.2)
Drug interactions	
• Potential interaction	8 (2.8)
• Manifest interaction	5 (1.8)
Other DRP	
• Insufficient awareness of health and diseases	133 (47.2)
• Patient dissatisfaction with therapy	30 (10.6)
• Complain not clear	11 (3.9)

Table 20: Correlation of primary MRPs with levels of intervention

Correlations				
		At Prescriber Level	**At Patient or Carer Level**	**At drug Level**
Adverse Reaction Problem	Pearson Correlation	-0.022	0.032	0.010
	Sig. (2-tailed)	0.717	0.588	0.865
	N	282	282	282
Drug Choice Problem	Pearson Correlation	-0.106	0.138	-0.021
	Sig. (2-tailed)	0.076	0.020	0.728
	N	282	282	282
Dosing Problem	Pearson Correlation	-0.062	0.173	0.133
	Sig. (2-tailed)	0.298	0.004	0.026
	N	282	282	282
Drug use Problem	Pearson Correlation	-0.025	0.096	0.006
	Sig. (2-tailed)	0.676	0.109	0.924
	N	282	282	282
Interaction	Pearson Correlation	-0.011	-0.051	0.060
	Sig. (2-tailed)	0.856	0.390	0.313
	N	282	282	282
Other	Pearson Correlation	-0.064	0.113	-0.003
	Sig. (2-tailed)	0.287	0.059	0.966
	N	282	282	282
**. Correlation is significant at the 0.01 level (2-tailed).				
a. Cannot be computed because at least one of the variables is constant.				
*. Correlation is significant at the 0.05 level (2-tailed).				

Analysis of Variance (ANOVA)

Research question: Will inappropriate drug choice problem be influenced by the educational Level of patient?

H_0: Inappropriate drug choice problem does not depend on patient educational Level

H_1: Inappropriate drug choice problem depend on patient educational Level

Table 21: Tests of Between-Subjects Effects

Dependent Variable: Inappropriate drug (not most appropriate for indication)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	30.782[a]	123	.250	1.179	.165
Intercept	311.580	1	311.580	1.467E3	.000
Edu_Formal	.682	1	.682	3.212	.075
SEX	.164	1	.164	.771	.381
AGE	11.126	48	.232	1.092	.338
Edu_Formal * SEX	.089	1	.089	.421	.518
Edu_Formal * AGE	4.698	24	.196	.922	.573
SEX * AGE	6.178	27	.229	1.078	.373
Edu_Formal * SEX * AGE	3.566	14	.255	1.199	.281
Error	33.339	157	.212		
Total	578.000	281			
Corrected Total	64.121	280			

a.   R Squared = .480 (Adjusted R Squared = .073)

Reporting the analysis results:

H_0: accept in favor of H_1 for Edu_formal (formal education)

Explanation: As indicated in table 3 above, because the significance value of sex (.381), age (.338) and Educ_formal (.075) were more than the usual threshold value of 0.05, it can be concluded that these 3 factors alone do not influence P2.1 (Inappropriate drug choice selection problem), leading to the conclusion that the three variables do not have any influence on P2.1

Research question: Will in sufficient awareness of health and diseases be influenced by the educational Level of patient?

H_0: Insufficient awareness of health and disease does not depend on patient educational Level

H_1: Insufficient awareness of health and disease depend on patient educational Level

Table 22: Tests of Between-Subjects Effects

Dependent Variable: Insufficient awareness of health and diseases (leading to future problem)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	60.226[a]	123	.490	7.871	.000
Intercept	369.877	1	369.877	5.946E3	.000
Edu_informal	20.269	1	20.269	325.826	.000
SEX	.024	1	.024	.384	.537
AGE	3.257	48	.068	1.091	.339
Edu_informal * SEX	.002	1	.002	.026	.872
Edu_informal * AGE	1.711	24	.071	1.146	.301
SEX * AGE	2.280	27	.084	1.357	.127
Edu_informal * SEX * AGE	1.736	14	.124	1.993	.021
Error	9.767	157	.062		
Total	728.000	281			
Corrected Total	69.993	280			

a. R Squared = .860 (Adjusted R Squared = 751)

Reporting the analysis results:

H_0: reject in favor of H_1 for Educ_informal (Informal education) and the interaction between Informal education, age and sex (**Educ_informal*sex*age**).

Explanation: As indicated in table 3 above, because the significance value of sex (.537) and age (.339) were more than the usual threshold value of 0.05, it can be concluded that these factors alone did not influence awareness of health and diseases. The significance value of Educ_informal (.000) and the interaction between Educ_informal*sex*age (.021) were less than the threshold value (0.05), leading to the conclusion that informal educational level of patient and the combination of age and sex do influence the awareness of health and diseases of a patient.

Table 23   Correlation of Primary problems with causes of MRPs

Correlations		Drug/Dose Selection	Drug use Process	Information	Patient/Psychological	Pharmacy/ Logistics
Adverse Reaction Problem	Pearson Correlation	-0.040	-0.030	0.021	0.065	-0.054
	Sig. (2-tailed)	0.500	0.617	0.721	0.280	0.369
	N	282	282	282	282	282
Drug Choice Problem	Pearson Correlation	0.158	-0.019	0.113	-0.300	-0.032
	Sig. (2-tailed)	0.008	0.747	0.057	0.000	0.595
	N	282	282	282	282	282
Dosing Problem	Pearson Correlation	0.214	0.210	-0.009	0.281	0.141
	Sig. (2-tailed)	0.000	0.000	0.886	0.000	0.018
	N	282	282	282	282	282
Drug use Problem	Pearson Correlation	0.109	-0.044	-0.018	0.133	0.214
	Sig. (2-tailed)	0.067	0.463	0.758	0.026	0.000
	N	282	282	282	282	282
Interaction	Pearson Correlation	-0.035	-0.076	-0.023	-0.019	-0.027
	Sig. (2-tailed)	0.557	0.202	0.698	0.747	0.654
	N	282	282	282	282	282
Other	Pearson Correlation	0.104	0.018	0.208	-0.266	-0.157
	Sig. (2-tailed)	0.082	0.767	0.000	0.000	0.008
	N	282	282	282	282	282
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

*Figures does not add up to 100 percent because of multiple responses

IV. DISCUSSION

A total of 282 patients were interviewed as a sample size for the survey. Of these, 145 patients accounting for about 51.4 per cent had antibiotic medication problems, while 130 patients accounting for about 46.1 percent had analgesics medication problem.

Only 7 patients (2.5 percent) had both antibiotic and analgesics medication problems. Out of the 282 patients

interviewed, about 52.1 per cent were males and 47.9 percent were females.

Of the 145 patients that had antibiotic medication problems, about 47.6 percent were males, while 52.4 per cent were females compared to 56.2 percentMales and 43.8 percent females that had analgesics medication problems.

More females were requesting for antibiotics than males since females used them (unscientifically) for additional purposes exclusive to them e.g. ampiclox, to facilitate menstrual flow and as a post-coital contraceptive, and also as an adjunct in dealing with menstrual pain.

The survey result in shows both the mean and median ages of patients involved in medication related problems. The average age for all patients was 36.7 years while the median age was 35 years. On average, the ages of patients (39.6 years) with analgesics medication related problems are higher than those of patients (33.8 years) with antibiotic medication related problems. The trend in the median ages for all patients is similar to that of the mean ages.

Majority of the patients accounting for almost 20 per cent were between the ages of 25-29 years. About 31 per cent of the patients were between the ages of 30-39 years, followed by 40-44 years that accounted for about 15.2 per cent of the patients. This means that majority of the patients that had medication related problems were concentrated in the middle age group. These findings were similar to the findings of Stosic et al in Australian consumers.

In a study involving Australian consumers],it was observed by Stosic et al[62] ,that, more people under the age of 54 years reported regular use of OTC analgesics than did those aged 55 years or more, with a higher proportion of these respondents using NSAIDs than paracetamol. Regular use of paracetamol was significantly higher than that of NSAIDs in respondents aged 65 years or more in 2001 and in 2009 ($P < 0.05$).

This shows that inspite of geographical, cultural and socio-economic differences, the   trends were similar, though a bit surprising, since it may have been expected that the figure would have been higher for respondents above 55 years

The majority of patients, 147 accounting for 52.1 percent were in the informal category, which implies that they were illiterate. Of these, 51.4 per cent were females and 48.6 per cent were males, compared with 135 patients accounting for 47.9 per cent who were in the formal category, which means that they were literate and of this, 56.6 percent were males and 44.4 per cent were females.

It was therefore obvious that medication related problems were almost equally common amongst formally educated patients as they were amongst illiterates.

This data is consistent with data obtained in countries that enjoyed a higher level of basic education and in which people were more enlightened and had access to a greater array of information from different sources. For instance in a nationwide study conducted by Stosic et al in Australia[62] only 13 percent of respondents   were aware of the need to consider current or previous gastrointestinal conditions prior to NSAID use. This figure increased to 22 percent in subsequent years but was still significantly low for a highly enlightened society. Similarly, only 11 percent of respondents in this survey were aware that hepatic impairment was a precaution for excessive paracetamol use.

75.9 percent of MRPs in the primary domain were due to drug choice problems, 52.1 percent due to dosing problems and 53.2 percent due to others. Where others refer to any of the following: i) Patient dissatisfied with therapy despite taking drug(s) correctly)   ii) Insufficient awareness of health and diseases (possibly leading to future problems)   iii) Unclear complaints, further clarification necessary   iv) Therapy failure, reason unknown.

Drug interactions accounted for 3.2 percent of the primary domain problems. Analysis of drug interactions were however limited in this study because there was no follow up on drug interactions, all information on drug interactions were obtained only once –when the patient was being counseled and questionnaire administered , follow up was focused only on assessing the outcome of interventions. Also drug interactions that did not include analgesics/antibiotics were observed during counseling but obviously not included in this study.

A total number of 184 cases solved showing that the interventions were effective and that drug related problems can be handled via effective counselling, which identifies the problems which can then be solved by a professional. The results of this study are similar to a study conducted in 2005 in Germany to identify the spectrum of MRPs encountered in community pharmacies and the impact of interventions at this level. [37]It was concluded thatPharmacists in the community pharmacy setting are well suited to identify and resolve MRPs and that this specific role of pharmacists within the healthcare system needs to be more fully recognized. [37]

A good number of participants selected inappropriate medications (64.5) and a significant proportion of participants (47.2 percent) were insufficiently aware of health and diseases. The majority of patients did not understand the why behind their choices, they just had a link in their minds- stomach ache –I use chloramphenicol for instance. These assumptions were influenced by a variety of factors-previous prescription for what they may perceive to be related ailments, information from friends etc.

Drug Choice problems (P2) and Dosing problems (P3) were the most prevalent main domain problems for both antibiotics and analgesics

C1 (drug/dose selection) and C3 (drug use process) were the most predominant primary domain causes of the MRPs in this study. Most of the self medicators either did not use the correct drug/dose or were overdosing or under dosing

I2 (intervention at patient/Carer level) and I3 (intervention at drug level) were the most frequent interventions made, with I2 being slightly higher with antibiotics and I3 being slightly higher with analgesics.

OI (problem totally solved) was the most predominant outcome, seconded by   O 0.0 (outcome of intervention unknown).Indicating that the greater proportion of the interventions were effective and that MRPs in self –medication could be solved by providing relevant pharmaceutical care in the form of patient counselling and professional recommendation.
Analysis of variance tests done on the data obtained showed that sex by itself, age by itself and formal/informal education by itself does not affect P2.1 (Inappropriate drug choice selection problem), leading to the conclusion that the three variables individually does not have any influence on P2.1.However the

analysis of variance did show that that informal educational level of patient and the combination of age and sex do influence the awareness of health and diseases of a patient.

V. CONCLUSION

A lot of irrational drug use occurs in self-medication. This leads to and is responsible to some extent for some of the MRPs in self-medication.

It is obvious from this study that MRPs abound in self - medication and that people hold strong unscientific and in some cases totally irrational perceptions on the uses, doses, effects etc of various medications.

A highlight of the data is the importance and impact of effective interventions. The greater percentages of the interventions were effective and hence successful- they were accepted by the patients and produced desired therapeutic outcomes.

A total number of184 cases were resolved, showing that, where problems .could be identified, the interventions were effective and that drug related problems can be minimized via effective counseling and pharmaceutical care.

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