Evaluation of knowledge, attitude and practices of pharmacy professionals towards reporting adverse drug reactions in Sierra-Leone

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ABSTRACT

Background: Knowledge of reporting adverse drug reactions by health professionals remains unresolved.

Objectives: To determine the knowledge, attitude and practices (KAP) of practicing pharmacy professionals to the reporting of adverse drug reaction (ADR) as well as evaluate the factors that influence ADR reporting in Sierra-Leone.

Methods: A cross-sectional study was conducted among 150 practicing pharmacy professionals using a pre-tested questionnaire which elicited appropriate responses on the objectives of the study. Data were analyzed using SPSS version 16. The relationship between KAP of ADR reporting and demographic variables was analyzed with the chi-square statistics at $P < .05$ level of significance.

Results: The response rate was 90%. There was no significant difference between knowledge of ADR reporting and qualification of respondents (x^2 =2.6, P=0.59). There was a significant difference (x^2 =3.5, P=0.003) between years of practice of respondents, and knowledge of ADR reporting. There were significant differences between the practice areas of respondents, with knowledge (x^2 =4.2, P=0.001) and number (98/135; x^2 =2.65, P=0.006) of ADRs reported. The difference in mean score of respondents (1.90±1.35) mean±SD that felt ADR reporting should be compulsory and those who felt otherwise (3.58±1.73) mean±SD was significant (x^2 =2.1, P=0.001). Result showed that factors influencing ADR activities were professional experience 101(74.8%), inadequate knowledge about ADRs 89 (65.9%) and access to ADR reporting forms.

Conclusions: The study revealed some knowledge gaps among practicing pharmacy professionals in the monitoring and reporting of ADRs in Sierra-Leone. This makes it imperative to design educational programmes on ADR activities for practicing pharmacy professionals in order to improve ADR reporting.

Key words: Practicing pharmacy professionals, ADR reporting, Sierra-Leone

Evaluation de la connaissance, de l'attitude et des pratiques des professionnels en pharmacie vers le reportage des effets indésirables aux médicaments en Sierra-Leone

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RESUME

Contexte: La connaissance de reportage des effets indésirables aux médicaments par les professionnels de la santé reste irrésolue.

Objectifs: Déterminer la connaissance, l'attitude et les pratiques (KAP) des professionnels exerçant en pharmacie dans le reportage des effets indésirables aux médicaments (ADR) et aussi déterminer les facteurs qui influencent le reportage des effets indésirables en Sierra-Leone.

Méthodes: Une étude transversale fut conduite chez 150 professionnels exerçant en pharmacie à l'aide d'un questionnaire pré-testé qui permit d'obtenir des réponses appropriées sur les objectifs de l'étude. Les données furent analysées à l'aide de la version 16 du logiciel SPSS. Le rapport entre KAP et des reportages de ADR et des variables démographiques furent analysées avec les statistiques chi-carré à P < ,05 niveau d'importance.

Résultats: Le taux de réponse était de 90%. Il n'y avait aucune différence notable entre la connaissance des reportages de ADR et la qualification des répondants ($_{\chi}2$ =2,6, P=0,59). Il y avait une difference notable ($_{\chi}2$ =3,5, P=0.003) entre les années de practique des répondants, et la connaissance de reportage de ADR. Il y avait des differences notables entre les domaines d'exercice des répondants, avec une connaissance ($_{\chi}2$ =4,2, P=0.001) et un nombre (98/135; $_{\chi}2$ =2,65, P=0,006) des ADRs rapportés. La différence dans la note moyenne des répondants (1,90±1,35) moyenne±ET (écart-type) qui pensent que le reportage de ADR devait être obligatoire et ceux qui pensent autrement (3,58±1,73) moyenne±ET était important ($_{\chi}2$ =2,1, P=0,001). Le résultat a indiqué que les facteurs influençant les activités ADR étaient l'expérience professionnelle 101(74,8%), la connaissance inadéquate sur les ADRs 89 (65,9%) et l'accès aux formes de reportage de ADR.
Conclusions: L'étude a révelé des lacunes de connaissance parmi les professionnels exerçant en pharmacie dans le contrôle et le reportage des ADRs en Sierra-Leone. Ceci rend impératif la conception de programmes éducatifs sur les activités de ADR pour les professionnels exerçant en pharmacie afin d'améliorer le reportage de ADR.

Mots-clés: Professionnels exerçant en pharmacie, reportage ADR, Sierra-Leone

INTRODUCTION

Adverse drug reaction (ADR) is defined as a response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis, or therapy of disease or for modification of a physiological function.[1-2] However, an ADR differs from a side effect or an allergy because side effect is an expected and known effect of a drug that is not the intended therapeutic outcome.[3] On the other hand, medication errors which are mishaps that occur during prescribing, transcribing, dispensing, and administering, a drug could cause ADRs.[3] Exaggerated or incompletely documented side effects can be ADR. The World Health Organization, under the pharmacovigilance programme, mandated member nations to report ADRs either spontaneously (passive pharmacovigilance) or by active monitoring and directly to their various local coordinating centres or central coordinating point at Uppsala, Sweden.[4] The mode of reporting is usually through the individual case reports such as the yellow card reporting scheme for suspected ADR's.[5] This is the first line of evidence which could help to recognize an unexpected ADR. It brings the health professional and consumers together in terms of monitoring and regulation of medicines. The four critical pieces of information that must be included on the yellow card are; suspected drugs, suspected reactions, patient details and reporter details. Additional information may include concurrent medication, diagnostic test results, and known allergies.[5] Other reporting systems are cohort-event monitoring (CEM), which allows quantification of adverse event rates and seeks information on events that may not otherwise be reported. Cohorts allow reporting of all events, and incident rates to be estimated and compared across medicinal products. An example of CEM is prescription-event monitoring.

Patient records can be used to compare cohorts of exposed patients. However, the reporting systems and the healthcare personnel that have the mandate to report ADRs differ among countries.[6] Likewise, pharmacists' knowledge, attitude and practices towards reporting ADRs vary per country. For instance, in the United States of America (USA), United Kingdom (UK), Netherlands, and Africa among others, pharmacists' report ADRs while in the Scandinavian countries nurses and the clergy may report ADRs while pharmacists are not authorized to do so because they do not have access to patients' medical file.[7-8] In the UK in particular, those who can report ADRs are doctors, dentists, coroners, pharmacists, nurses, midwives, health visitors and pharmaceutical companies under statutory obligations.[9]

Some scholars advanced reasons that pharmacists may not participate in ADR reporting because they have limited clinical knowledge based on the nature of their training, and may be unclear about what should be reported.[10-12] However, others argue that in terms of clinical knowledge for effective reporting of ADRs, the scope of pharmacy training has indeed evolved and shifted to meet the requirements of patient-centered care in pharmacy practice[13] with the introduction of clinical pharmacy, internship and clerkship programmes among others. Again as custodians of medicines, pharmacists are experts in pharmacotherapy because they not only provide information about medicine use, but also render pharmaceutical care services to patients[14-15.] Furthermore, pharmacists are readily accessible to patients. In this regard they advice patients directly, and are the most likely to detect adverse reactions.[16-19] Even at that, the reporting rate of ADRs by pharmacists has been low in developed countries and worse for developing nations where poor knowledge of and attitude towards the practice of ADR reporting among pharmacists have been documented.[20-23] Again there is paucity of information on pharmacist knowledge, attitude and practices towards reporting ADRs in developing countries.

The objectives of this study were to investigate pharmacy professionals' attitude towards reporting ADRs, to assess their practices in this regard and to evaluate their knowledge in ADR reporting in Sierra-Leone. This is with a view to developing strategies that could improve ADR reporting in the healthcare sector in Sierra Leone.

Pharmacy education and practice in Sierra Leone

Pharmacy education and training takes place in the Faculty of Pharmaceutical Sciences of the College of Medicine and Allied Health Sciences (COMAHS) of the University of Sierra Leon. COMAHS was founded in 1988 and it is the most recent of the three colleges that constitute the University of Sierra Leone. The other colleges and their years of establishment are Institute of Public Administration and Management (IPAM, 1981) and Fourah Bay College (FBC, 1827). At COMAHS, pharmacy education obtainable included Pharmacy Technicians and Bachelor of Pharmacy programmes. The pre-requisites for admission into the Pharmacy programmes are credit passes at college level in Biology, Chemistry, Physics and Mathematics. Generally, entrance examinations are conducted to determine

eligibility to any of the programmes. The B. Pharm. degree programme runs for 6years with 4 years spent in the basic clinical sciences. The courses in the pre-professional curriculum include the basic sciences with Pharmacology and Biochemistry. These courses are intended to prepare students for the two academic years spent in the professional pharmacy curriculum. The curriculum consists of courses in 6 major areas of instructions and these are Pharmaceutical Chemistry, Pharmaceutics, Pharmacognosy, Pathophysiology, Clinical pharmacy and Therapeutics. Instructions in the basic clinical sciences and in the professional areas include laboratory work, clinical rounds and patient case studies. The Faculty of Pharmaceutical Sciences of the University of Sierra Leone (SL) trains both the pharmacy technicians and BPharm Degree holders. The pharmacy technicians are in the majority and they operate most of the pharmacy outlets in the country, dispensing both prescription and non-prescription drugs. Both groups are referred to as pharmacy professionals (PP) in SL and they manage drug distribution and supply in the pharmacy outlets, dispensing both prescription and non-prescription drugs. The pharmacy technician program and the bachelor's curriculum are designed to produce competent pharmacy professionals who can apply their training in effective patient care and medicine management in the health care facilities. However, the pharmacy technicians are required by law to operate under the supervision of certified pharmacists.

Graduates of pharmacy programme in the University may register with the Pharmacy Board of Sierra Leone (PBSL), which is the regulatory body for pharmacy practice and licensing of pharmacy professionals in the Country. The B. Pharm. graduates are required to undergo the statutory continuous internship training of one year under the supervision of a registered pharmacist at premises approved by the Board. On completion of the training, the interns are expected to take a pre- registration examination which determines their qualification for licensure to practice pharmacy in Sierra Leone. In addition to initial training, requirements for licensure to practice in Sierra Leone both the B. Pharm. holders and pharmacy technicians are expected to participate in the Continuing Professional Development (CDP) program for recertification after 3 years of graduation. The CPD is a 3-year cycle programme developed into 3 modules of topics relevant to assist pharmacy professionals to keep abreast of recent advances in medicine use and trends in pharmacy practice. The practicing license is renewable every year, and for this purpose each registered pharmacy professional must obtain a minimum of 30 credit units within the recertification period of 3 years.

Pharmacovigilance in Sierra Leone

The drug safety monitoring programme (Pharmacovigilance) in Sierra Leone was set up in 2006 with funds initially provided by the Global Fund Project with contributions from the Health Sector Support Project, EU/Malaria Project and the Government of Sierra Leone when the country was about to change its treatment policy for malaria from chloroquine as first line medicine to artesunate and ammodiaquine for the treatment of uncomplicated malaria. This system was however adapted not only to monitor the safety profile of antimalarials but also of other drugs used in health care delivery within the country. The programme was hosted by the Drug Information and Pharmacovigilance Department (DIPD) of the Pharmacy Board of Sierra Leone which serves as the National Pharmacovigilance Centre. Sierra Leone attained full membership status of the WHO Drug Safety Monitoring Programme in October, 2008. Since the inception of the drug safety monitoring programme a number of activities have been undertaken by the Pharmacy Board to further strengthen the programme. The conduct of this study therefore will serve to assess the impact of the programme on pharmacy professionals in Sierra Leone.

The Pharmacy Board (PB) of SL is in the vanguard of Pharmacovigilance and a workshop had been conducted in this regard to educate the PP. In addition, the PB produces a form for reporting ADR in health facilities but apparently, the distribution is limited hence the need for this survey, to assess the KAP of PP to ADR reporting and to also identify the limitations including the availability of ADR reporting forms at the health service delivery points (dispensing points of the health care systems).

The Pharmacy Board of Sierra Leone is the medicines regulatory agency in the country and was set up by an Act of Parliament (Pharmacy and Drugs Act 1988 which was later reviewed in 2001) with the mission of ensuring that appropriate and workable regulatory guidelines are implemented in order to achieve the highest practicable standards of the practice of pharmacy by professionals. It also monitors the safety, efficacy and quality of all drugs, medical devices, cosmetics and nutritional agents (collectively termed 'products') locally manufactured, imported, exported, distributed, sold or used to ensure the protection of the public health as envisaged by the Pharmacy and Drugs Act.

METHODS

Study design/setting

The study was carried out between June and December, 2014 in Sierra-Leone. Sierra-Leone is an English speaking country located along the West African Sub-region with a population of about 6 million people. Sierra-Leone lies to the east of Atlantic Ocean, and shares boarders with Guinea and Liberia. It spans an area of 71,740 sq. km.[24] The target population for this study was practicing pharmacists and pharmacy technicians in hospitals, retail pharmacies, clinics, and Pharmacy Board of Sierra Leone.

Sample size

A sample size of 150 respondents was surveyed using a convenient sampling technique. The sample size was obtained using Cochran (1977) formula[25] assuming a 5% error and a 90% response rate. A cross-sectional survey was conducted in each of the practice areas. Pre-tested but structured questionnaires were administered to the target population at the mandatory professional development programmes held at each of the four geographical zones of Sierra Leone. Written consent to take part in the study was sought during the initial contact. Voluntary participation of respondents was emphasized; hence data collection procedure for the survey was non-invasive.

Data collection

The questionnaire was divided into three major sections. The first section contained the demographics, such as age, sex, year of qualification, educational qualification of respondents, experience, and area of practice of respondents. Section B contained questions on core issues of Knowledge, Attitude and Practices (KAP). The variables in this section include but not limited to, questions that would assess the knowledge of respondents on ADR reporting. These questions include definitions of ADR, side effects and the concept of pharmacovigilance among others. Knowledge of ADR was assessed in percentages with respect to the number of respondents who gave the correct answers to the questions. Furthermore, questions were asked on respondents' sources of knowledge on ADR, their perceptions and attitude towards the reporting of ADRs. Information was sought from respondents on persons responsible for reporting ADR, as well as the use of the Yellow forms in ADR reporting and where such reports were directed to. Section C contained questions designed to elicit appropriate responses on perceived factors that may influence the reporting of ADRs as well as strategies to be deployed to improve ADR monitoring and reporting.

The method employed in this study was adapted from the ones used in similar studies elsewhere, but with slight modifications to suit the Sierra-Leone environment.[26-27]

Data Analysis/ Description of methodology

Data were analyzed using the SPSS version 16. Results were presented as means ± SD for quantitative variables, median with inter-quartile range (IQR) for time related variables, and numbers with percentages, for categorical variables. The relationship between respondents' opinion in the knowledge domain was determined using chi-square statistics at $P < .05$ level of significance.

Ethical consideration

Approval for the study was obtained from the health research committee of the Pharmacy Board of Sierra-Leone. Respondents voluntarily signed the written consent to take part in the study. Hence data collection procedure for the survey was non-invasive.

Results

The response rate for the questionnaire administered for the study was 90% since 135 out of 150 questionnaires were properly filled, harvested and used for the final analysis. The demographic characteristics of respondents are presented in Table 1.

Table 1: Demographic data of respondents

Characteristics	Values
Male : Female ratio	3 : 1
Median age(years)	42(IQR40-44)
Median year of qualification	15(IQR6-18)
Median year of practice	11(IQR4-15)
Educational Qualification	
Pharmacy Technicians	63(46.7%)
B. Pharm	38(28.2%)
MPharm /MSc/ MPhil	29(21.5%)
Pharm D	5(3.7%)
Pharmacy Practice Areas	
Hospital	64(47.4%)
Community	53(39.3%)
Regulatory/Administrative Pharmacy	18(13.3%)

The practicing pharmacy professionals in Sierra-Leone were mainly into three practice areas namely, hospital, community practice, and regulatory/administrative pharmacy. Their sources of knowledge about ADR were from the British National Formulary 22(16.3%), pharmacy training 18(13.3%), text books 8(5.9%), workshops/seminars 1(0.7%), and a combination of the named sources 86(63.7%). In the knowledge domain, a high proportion of respondents 109(80.7%) correctly defined the term pharmacovigilance (PV), 98 (72%) had reported at least one ADR and 76(56.3%) were familiar with the differences between a side effect and an ADR (Table 2). However, majority of respondents 112(83%) could not explain what side effects meant. There was inadequate knowledge of respondents to possible adverse reactions to herbal medicines. Only a few respondents 30(22.2%) could correctly give the name of drugs that were banned sequel to the incidents of ADRs and fewer respondents 29(21.5%) could identify the place where ADR reports should be sent. Majority of respondents 114(84.4%) knew that the Yellow forms were meant for documenting ADR reports even though some of them 51(37.8%) claimed that the Yellow forms were not available in their places of work.

Identifying what to actually report appeared not to be a serious challenge to some of the respondents 120(88.9%) who opined that although it was difficult to clearly ascertain which drug caused an ADR especially with patients who took multiple medications for an ailment. Their knowledge about ADR reporting was enough to carry out adverse drug reporting. Also 89(65.9%) of the respondents averred that they needed more training on ADR reporting.

Table 2: Knowledge of respondents on ADR Reporting

Survey Statements	Answers	
	Yes	No
K1. An ADR is ……..	82 (60.7%)	53 (39.3%)
K2. ADR is a synonym for side effects	76 (56.3%)	59 (43.7%)
K3. A side effect is……..	112 (83%)	23 (17%)
K4. Any drug (including herbal medicines) can cause ADRs	104 (77%)	31 (23%)
K5. Pharmacovigilance is defined as ……	109 (80.7%)	26 (19.3%)
K6. Name any drug which was banned due to the incidence of ADRs.	105 (77.8%)	30 (22.2%)
K7. Name one ADR you have reported.	98 (72.6%)	37 (27.4%)
K8. Where did you send your ADR report to?	106 (78.5%)	29 (21.5%)
K9. Who should counsel patients on ADR?	88 (65.2%)	47 (34.8%)
K10. Do pharmaceutical manufacturing companies report ADRs?	83(61.5%)	52 (38.5%)

Ninety-three respondents (68.9%) believed that reporting an ADR is a breach of patients' confidentiality. More than half of the respondents 88(65.2%) were of the opinion that medical doctors are in the best position to monitor and report cases of ADRs. Forty-three (31.9%) of the respondents also affirmed that medical doctors are not only always in contact with their patients but also keep patients' case notes. Majority of respondents 78(58%) believed that it is easier for patients to give feedback to the doctors concerning their medications and attendant outcomes than to other healthcare professionals. The mean score of respondents (1.90±1.35) that felt ADR reporting should be compulsory among the professional pharmacists was less than the mean score of those (3.58±1.73) who advocated that ADR reporting should be voluntary. There was a significant difference ($_{\chi}2$ =2.1, P=0.001) between these mean scores. Apart from the belief by more than half of respondents 84(62.2%), that the reporting forms were too complicated to fill, 81(60%) revealed that ADR reporting forms were not available in their practice areas. Most respondents 120(88.9%) were of the opinion that patients do not report ADRs to the pharmacists.

Table 3: Association between respondents' knowledge about ADR reporting and some demographic variables

Variables	Chi-Square Values	P-values	Remarks
Year of qualification	2.6	0.59	Not significant
Years of practice	3.5	0.003	Significant
Area of Practice	4.2	0.001	Significant
No. of ADRs reported	2.6	0.006	Significant

P<0.05

Table 4: Respondents' Attitude towards ADR Reporting

Survey Items	Strong Agree 5	Agree 4	Undecided 3	Disagree 2	Strongly disagree 1	Mean score ± SD
A1. ADR reporting is a professional obligation for practicing pharmacist.	14 (10.37%)	10 (7.4%)	28 (20.74%)	3 (2.22%)	80 (59.23%)	2.07± 1.43
A2. ADR reporting should be compulsory for all health works	13 (9.63%)	9 (6.67%)	11 (8.12%)	21 (15.56%)	81 (60%)	1.90±1.35
A3 ADR reporting should be voluntary.	70 (51.85%)	18 (13.33%)	4 (2.96%)	6 (4.44%)	37 (27.41%)	3.58±1.73
A4. Only serious ADR should be reported.	6 (4.44%)	7 (5.91%)	2 (1.48%)	40 (29.63%)	80 (59.26%)	4.33±1.08
A5. ADR reporters should be given incentives	98 (72.59%)	11 (8.12%)	5 (3.70%)	10 (7.4%)	11 (8.12%)	4.30±1.29
A6. ADR reporters should keep proper documentation	90 (66.67%)	20 (14.82%)	12 (8.89%)	8 (5.3%)	5 (3.72%)	4.35±1.09
A7 Drug prescribers should keep proper documentation	70 (51.85%)	50 (37.04%)	8 (5.93%)	5 (3.7%)	2 (1.482%)	4.34±0.87

When the knowledge of respondents about ADR reporting was compared with their qualifications, result showed that there was no significant difference between knowledge of ADR reporting and years of practice ($_{\chi}2$ =2.6, P=0.59). However, there was a significant difference ($_{\chi}2$ =3.5, P=0.003) between year of qualification and knowledge of ADR reporting. There were significant differences between the practice areas of respondents and knowledge of PV ($_{\chi}2$ =4.2, P=0.001) and number (98/135; $_{\chi}2$ =2.65, P=0.006) of ADRs reported. Other attitudinal variables of respondents towards the reporting of ADRs are presented in Table 4.

Most of the respondents 121 (89.6%) perceived that reactions caused by drugs were already known and one report would not necessarily make any difference 98 (72.6%) to ADR reports. About half of the respondents 66 (48.9%) felt that they were too busy to create time for monitoring and reporting ADRs. While 56 (41.5%) felt they lacked the confidence to put up a sound ADR report in view of the consequences that may arise from inappropriate reports. Twenty-nine (21.5%) respondents believed that they needed more information on ADR before they could turn in meaningful reports. Other views of the respondents on ADR reporting are presented in Table 5.

Table 5: Respondents' perceptions to ADR reporting (n=135)

Survey Items	Strong Agree 5	Agree 4	Undecided 3	Disagree 2	Strongly disagree 1	Mean score ± SD
P1.Reporting ADR improves quality of patient care.	73 (54.1%)	18 (13.3%)	24 (17.8%)	11 (8.2%)	9 (6.7%)	4.0±2.7
P2. Reporting drug safety is important to patients.	103 (76.3%)	21 (15.6%)	3 (2.22%)	4 (2.96%)	4 (2.96%)	4.59±0.92
P3. ADR reporting reduces the cost of therapy	19 (14.1%)	11 (8.2%)	98 (72.6%)	3 (2.22%)	4 (2.96%)	3.2±0.84
P4. ADR reporting is part of the duty of professional pharmacist	66 (48.9%)	29 (21.5%)	10 (7.41%)	24 (17.8%)	6 (4.44%)	3.80±1.63
P5.ADR reporting is important	110 (81.5%)	6 (4.44%)	2 (1.48%)	5 (3.7%)	12 (8.9%)	4.46±1.25

Table 6: Responses of different cadre of pharmacists on knowledge of ADR reporting

Qualification	Value (%)	
	ADK	LNK
Pharmacy Technicians	6 (9.5%)	57(90.5%)
BPharm	20(52.6%)	18(47.4%)
MPharm /MSc/ MPhil	21(72.4%)	8(27.6%)
Pharm.D	5(100%)	NIL
Practice area		
Hospital	34(53.1%)	30(46.9%)
Community	39(73.6%)	14(26.4%)
Regulatory/Administrative Pharmacy	16(88.9%)	2(11.1%)

ADK= Adequate knowledge, LNK= Little knowledge

In Table 6 above, a majority of pharmacy technicians 57(90.5%) had little knowledge of ADR reporting, while pharmacists who had clinical pharmacy background (Pharm D) indicated that they have adequate knowledge to report ADRs. The pharmacists in regulatory/ administrative domain 16(88.9%) also claimed that they could effectively report adverse drug reactions.

Suggested ways of improving knowledge, attitudes and practices (KAP) of monitoring and reporting ADRs by respondents were: sensitisation of practicing pharmacy professionals through advocacy on the need to report ADRs 130(96.3%), regular training on ADR reporting through workshops, and seminars 112(83%), continuing education on ADR reporting 108(80%), encouraging patients to report incidents of ADRs 98(72.6%), availability of ADR reporting forms 101(74.8%), monetary incentives for reporting ADRs 94(69.6%), and involvement of all health workers in ADR monitoring and reporting 114(84.4%).

DISCUSSION

There were a lot of knowledge gaps among the practicing pharmacy professionals in Sierra-Leone about the monitoring and reporting of ADRs. These inadequacies could be ascribed to, limited knowledge on ADRs and how to report same. This may be due to inadequate coverage of PV courses in the faculty of pharmacy curriculum. To enhance the teaching of PV, measures must be put in place in the school's curriculum to incorporate subjects relevant to pharmacovigilance early enough in the years. This would give students enough time to appreciate the subjects before they graduate. The knowledge obtained from the official books and from undergraduate lectures in the universities was not adequate in view of the poor knowledge of respondents in reporting ADRs as revealed by the study. In addition, only 0.7% of respondents claimed to have seminars and workshops on ADR reporting. This number is few for any meaningful impact on improving ADR reporting. Attendance and exposure of more respondents to relevant workshops and seminars may help to update their knowledge on how to report ADRs. However, there was a positive correlation between the years of practice and knowledge of how to report ADRs. This finding agrees with what was obtained from a similar study[28] where it was stated that education and training influences ADR reporting. In addition, this study revealed that year of experience/practice and knowledge influences ADR reporting. There is therefore the need to sustain ADR reporting and encourage senior colleagues to get interested in reporting ADR as it adds to quality of report.

Other prominent knowledge gaps that were revealed by the study include the inability of most of the respondents 112(83%) especially the pharmacy technicians, to clearly define what a side effect[3] is as well as the inability of the respondents 104(77%) to determine whether some specific drugs (including herbal medicines) could cause ADRs. Apart from inadequate supply of forms to report ADR as claimed by 51(37.8%) of the respondents, there was a challenge on how to fill these forms as most of the respondents claimed that the forms were too complex. Issues with the use of the Yellow forms for reporting ADRs have been of utermost concern in academic discourse over the years.[29, 30] Perhaps using samples of the Yellow forms as a practice tool in the teaching of PV subjects by pharmacy educators may help reduce the problems associated with the use of the Yellow form. In addition, most of the respondents106 (78.5%) did not know where to send ADR reports. Also, majority of the respondents 88 (65.2%) could not determine who amongst the health care professionals should counsel patients on ADRs. In any case, inadequate knowledge of ADR, lack of confidence which were hitherto identified as obstacles to ADR reporting may be responsible for this confusion. Similar knowledge gaps in ADR reporting had been highlighted in studies carried out in the United Kingdom, Rhode Island and Hong Kong.[31-34] Only a few of the respondents 105(77.8%) could name drugs that were banned as a result of severe ADRs. These findings are similar to the results, obtained from a previous study[26] when a survey of the perception of doctors to ADR reporting in a teaching hospital was undertaken. In that study, it was posited that lack of knowledge of where ADR should be reported was a major finding and such could mar ADR reporting programme. However, the study, suggested that setting up ADR advocacy centres in hospitals would help create more awareness on ADR reporting.

The significant differences between the knowledge base on ADR reporting and the practice area of respondents along with the number of ADRs reported is expected because previous studies[35-38] revealed that hospital pharmacists (clinical pharmacists) are in a better position to report ADRs than pharmacists in other practice areas because the former are more in contact with patients.[14-19] Also they have easier access to patients' medication file. The notion by 93(68.9%) of respondents that ADR reporting constitutes a breach of patients' confidentiality, although borders on ethical issue; appears illogical because the entire healthcare team in the first instance, is meant to ensure optimal patient care through appropriate medication use by monitoring therapeutic outcomes. This is what medical and pharmaceutical care is all about. Most respondents alluded to this assertion in Table 4 where they averred that ADR reporting is a professional obligation of pharmacists. In addition, the essence of ADR reporting includes reduced cost of therapy, ensured patient safety, and improved quality of life of patients. Majority of the respondents 88(65.2%) felt that medical doctors are in the best position to monitor and report ADRs and 43(31.9%) of the respondents supported this claim because they observed that doctors are always in contact with patients, they also keep patients medical records.

Documentation of patient medication history is barely in existence in most pharmacy practice settings.[23] However, the argument about which healthcare segment is more qualified to monitor and report ADRs is

still very much in contention.[39,40] In all, the fundamental thing is that every segment of the healthcare team should complement each other and optimize the monitoring and reporting of ADRs for the overall benefit of the patient as well as to increase the credibility of the ADR reporting system.[41] However, that most pharmacy technicians claimed they lacked the knowledge to report ADRs was expected in view of the fact that their academic curriculum or course content is not expected to be robust or comprehensive enough to cover core pharmacy subjects. This does not foreclose the fact that they could learn how ADR reporting is done through hands-on approach. On the other hand, all pharmacists with the Pharm.D degree agreed that they could effectively report ADRs. This is expected because their training should be clinical oriented and patient-centered[13] with prominent bias in pharmaceutical care. In such setting, courses in PV subjects are expected to be well taught.

Almost all the respondents agreed that ADR reporting remains a professional obligation of pharmacists and that reporting should be either voluntary or mandatory. Respondents advocated that only serious ADRs should be reported; while it will be necessary to keep proper documentation by prescribers and reporters and in addition give reporters some kind of incentives. Spontaneous reporting system could be voluntary or mandatory depending on the country's pharmacovigilance system. However, information about ADR can only be credible if proper documentation is made by both prescribers and reporters. It is only by so doing that any adverse effects due to the use of drugs could be traced and reported. Proper documentation in this case remains the bedrock of a successful pharmacovigilance activity. The obstacles to ADR reporting as highlighted by the respondents include busy work schedule, lack of confidence, inadequate knowledge of ADR reporting skill, complexity and unavailability of the Yellow forms, apathy, inadequate information on ADR, and inability to determine where ADR reports should be sent. Some of these factors had been identified in various studies as reasons for ADR under-reporting world-wide.[26, 42-50] Nevertheless, the issue of under-reporting of ADRs could be reduced if the suggestions highlighted by the respondents in this study are implemented. These suggestions are sensitization of practicing pharmacy professionals through advocacy on the need to report ADRs, regular training on ADR reporting through workshops and continuing education, encouraging patients to report incidents of ADRs, availability of ADR reporting forms, compensation of ADR patients by government and possibly monetary incentives for ADR reporters.

The major limitation of this study is that the opinions of pharmaceutical manufacturers' representatives were not sought. Thus, the findings of this study cannot be generalized as a representation of what obtains in all segments of pharmacy practice in Sierra-Leone. Extending this study to other practice areas could form the basis for further study.

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CONCLUSION

The study revealed that a lot of knowledge gaps exist among practicing pharmacy professionals in the monitoring and reporting of ADRs in Sierra-Leone. Prominent among the identified knowledge gaps were lack of adequate information on PV activities, inability to determine where to send ADR reports to, challenge in filling the Yellow forms, and problem of drawing a clear distinction between side effects and adverse effects. Other attitudinal problems such as busy work schedule, indifference, lack of confidence, and poor pharmacist-patient relationship which were revealed by the study, could mar their good intension to carry out regular ADR monitoring and reporting. However, since more than ninety percent of pharmacists in Sierra-Leone know what to report, it is strongly suggested that they need motivation either by training through seminars and workshops on ADR reporting or through awareness creation in form of advocacy on ADR reporting. Doing so could reduce the incidence of under-reporting as well as enhance the quality of reports.

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