

Effect of Healthcare Professionals' Knowledge and Attitude Towards Reporting Adverse Drug Reaction (ADR) in Military and Paramilitary Hospitals in Enugu, Nigeria

Eselojor Gift Onyeye ¹; Agbo Ishmael Umunnakwe ²; and Dr. Maryjoy Umoke³

¹Department of Public Health, National Open University, Enugu, Nigeria. ²Department of Insurance and Risk Management, Faculty of Management of Sciences, Enugu State University of Science and Technology, Agbani, Enugu, Nigeria. ³Department of Health and Physical Education Alex Ekwume Federal University, Ndufu-Alike, Ikwo, Nigeria.

Corresponding author: agbo.ishmael@yahoo.com

DOI: <https://doi.org/10.62154/1xhfjx38>

Abstract

The study evaluated the effect of healthcare professionals (HCPs) on knowledge and attitude towards reporting adverse drug reactions (ADRs) in military and paramilitary hospitals in Enugu, Nigeria. The purpose of the study was to determine if the level of knowledge and attitude has any significant effect on reporting ADRs. Data were collected through the use of questionnaires from the healthcare professionals (Doctors, Pharmacists, and Nurses) because of the position they occupy in the implementation of pharmacovigilance procedures. The technique employed in the data analysis is regression and the following results were obtained: the level of knowledge of HCPs on pharmacovigilance had a P-value of $0.027 < 0.05$ while HCPs attitude had p-value of $0.010 < 0.05$. Hence, the study concludes that knowledge level and attitude significantly affect ADR reporting. The following recommendations were made in line the findings: the need to improve training programs across all strata of HCPs as a means of updating their knowledge of pharmacovigilance and ADR reporting procedures. Similarly, it is important to develop a culture of ADR Reporting amongst healthcare professionals in these hospitals; by raising the recognition of the importance of reporting both tolerable and moderate ADRs as well as previously unknown or severe ADRs, this strategy aims to promote a culture of ADR reporting.

Keywords: Knowledge, Attitude, Healthcare, Pharmacovigilance, Adverse Drug Reaction.

Introduction

Medicines play crucial role in improving life's quality and expectancy by easing symptoms, halting the progression of diseases, and treating illnesses. Drugs are not entirely risk-free (Kefale, Degu and Tegegne, 2020). Medicines are put through clinical and preclinical trials to establish their safety and efficacy before getting marketing authorization. These studies, unfortunately, do not include particular populations, like young children, the elderly, and pregnant women, which can introduce biases in discovering rare adverse drugs reactions. Therefore, it is essential to do post-marketing surveillance to find medication-related

concerns that might not have been found during the pre-marketing phase (Nadew, Beyene and Beza, 2020).

An adverse drug reaction (ADR) is an undesirable and unintentional outcome that occurs when a medication is taken in therapeutic doses that is intended to prevent, diagnose, treat or modify an ailment or alter physiological function (WHO, 2020). ADRs are serious hazard to public health safety since they can be life-threatening, impair patients, prolong hospital stays, and demand emergency room visits (Burud, Daher, Din, Agarwal, Zakaria and Agarwal, 2021). The thalidomide disaster, which happened almost 40 years ago and led to phocomelia in thousands of infants globally, is where the history of ADR monitoring began. (Alemu and Biru, 2019). Adisa and Onitogun (2019) assert that ADRs are a pervasive health problem that affects patients in all professional scenarios. ADRs are common and frequently preventable causes of hospital admissions that result in prolonged hospital stays, increased financial burdens, and occasionally mortality (Bepari, Niazi, Rahman, and Dervesh 2019).

ADR-related mortality has been increasing. Therefore, reporting ADRs is still essential for enhancing drug safety and lowering adverse effects (Danraka, Usman and Onavbavba, 2021). Spontaneous or voluntary ADRs reporting by HCPs is the main plan for post-marketing monitoring of problematic medications since, it enables for efficient and affordable reporting (Hussain, Hassali, Hashmi and Akram, 2021).

Pharmacovigilance, which identifies drug-related problems, assesses the benefit, effectiveness, harm, and risks, and prevents injuries while maximizing therapeutic outcomes, is an important tool for improving patient safety and care on a worldwide scale (Nadew, Beyene and Beza, 2020). Pharmacovigilance is the science and practices centered at detecting, assessing, understanding as well as avoiding adverse reactions and other concerns associated to medicinal products (Tekel, Bekalu and Sema, 2021). The goal of pharmacovigilance practices is to improve patient safety and care pertaining to medication and other medical treatments (Mweetwa, Kenaope, Mosala, Pule, Obure, Mothibe, Tshiamo and Oluwabusola, 2021).

Prior to healthcare professionals reporting ADRs, drugs like "*rofecoxib*" were withdrawn, which increased patient safety by enabling identification of rare, serious and previously undetectable ADRs (Nisa, Zafar and Sher, 2018). Every Healthcare professional must be involved, there must be extensive reporting, and there must be effective communication with pharmacovigilance centers for any pharmacovigilance system to function and be successful (AL-Mutairi, AlFayyad, Altannir, and Al-tannir, 2021). Seid, Kasahun, Mante, and Gebremariam (2018) defined spontaneous reporting systems (SRS) as voluntary systems in which healthcare professionals or patients or their relatives report suspected medication-related adverse reactions as soon as they suspect any such reaction. Level of knowledge, attitude and other factor are deemed to exact influence on reporting of ADRs among healthcare professionals, patients or their relatives.

Statement of the Problem

Adverse drug reactions, the sixth most common cause of mortality in the United States after accidents, heart disease, cancer, stroke, and lung illness, are important cause of illness and death globally. ADRs are extremely costly for some countries (Adedeji, Adegoke and Fehintola, 2021). Nigeria needs to create a reliable pharmacovigilance system in light of the morbidity and mortality rates connected to ADRs in Nigeria. ADR incidence affects people of all ages, which causes a lot of hospitalizations and places a heavy financial load on Nigerian society and the healthcare system. Well-known incidents like the Steven-Johnson disease the Nicolau syndrome associated with the usage of dipyrrone, and diethylene glycol event from My Pikin teething powder have had a negative impact on public health (Zainab, 2020).

Healthcare professionals must be aware of ADR reporting because they must have encountered ADRs while practicing. A multidisciplinary approach is necessary for effective ADR management hence, healthcare professionals must have the appropriate training in pharmacovigilance procedures (Mweetwa, Witika, Tshiamo, Adiukwu, Kenaope, Oluwabusola, & Makoni, 2021). According to Danraka, Usman, and Onavbavba (2021), who discovered that some percentage of hospital admissions are attributable to ADRs, this training will help lower the incidence of ADR-related mortality, which is on the rise. Yawson, Abekah, and Okai (2022) opine training is the main area that needs improvement. It was found that health workers exhibit a high level of expertise in the investigation of a few basic health centers in Ibadan, southern Nigeria pharmacovigilance, yet they know little about adverse drug reactions (Adisa and Omitogun, 2019).

Nigeria received membership in the WHO International Drug Monitoring Program in 2004 with the purpose of advancing drug safety in the country, defining the responsibilities of stakeholders in pharmacovigilance, training healthcare professionals and increasing public participation in drug safety measures, but it's still debatable how much of these goals have been accomplished. Unfortunately, National Pharmacovigilance Centre (NPC) has not yet reached the aim established by WHO of 200 reports per million population. This can be ascribed to a number of things, such as dropping healthcare standards, a lack of pharmacovigilance competence, a growing population, a weak framework and infrastructure, and insufficient funding and resources. a cumbersome and ineffective reporting process for ADRs, inadequate recognition of ADRs, lack of focus and dedication on pharmacovigilance by relevant parties and personnel, and under-reporting from healthcare professionals, all of which have a negative effect on the feedback received by NPC (Olowofela, 2018). These limitations are inadequate knowledge, lack of political will, and inadequate funds. Under-reporting of ADRs was observed across studies, which was primarily attribute to healthcare professionals' inadequate knowledge Attitude and Practice (KAP) (Tekel, Bekalu and Sema, 2021). These limitations motivated this study which aims at examining the level of knowledge and attitude of healthcare workers in the military and paramilitary hospitals in Enugu. Data were collected from the following

healthcare professional; Doctors, Pharmacists, and Nurses because of the position they occupy in the implement of pharmacovigilance procedures.

Objectives of the Study

The following are the objectives of the study:

- i. To determine the knowledge of pharmacovigilance among HCPs in military and para-military hospitals in Enugu on ADR
- ii. To determine the attitude of HCPs in reporting ADRs in military and para-military hospitals in Enugu.

Research Questions

- i. What is the knowledge of pharmacovigilance among HCPs in military and para-military hospitals in Enugu?
- ii. What is the attitude of HCPs in reporting ADRs in military and para-military hospitals in Enugu?

Research Hypothesis

The following hypotheses were specifically tested at $p < 0.05$ level of significance;

- i. The level of knowledge on pharmacovigilance among healthcare professional in military and para-military hospitals in Enugu is significant
- ii. The attitude of healthcare professional in military and para-military hospitals in Enugu is significant towards pharmacovigilance and ADR reporting.

Review of Related Literature

Conceptual Review

Evolution of Pharmacovigilance

One of the earliest incidents that were documented included a girl named Hannah who passed away after receiving a chloroform anesthesia prior to having an infected toenail removed. Although the cause of death was not known at the time, it did start to increase public awareness of unfavorable anesthesia-related outcomes (Fornasier, Francescon, Leone and Baldo, 2018). Sir James Simpson was the first to use chloroform anesthesia when he realized it was a more effective and safer anesthetic. The actual cause of Hannah's death was not specified but further deaths and alerts to the safety of anesthesia, sparked the pharmacovigilance movement. A commission was established by the Lancet Journal and charged English physicians, particularly those practicing in the colonies, to report cases of anesthesia-related fatalities (Aimer, 2020). Drugs had to be pure and uncontaminated according to the FDA, which was enacted on 30th June, 1906 and the body in 1911 prohibits false therapeutic indications of drugs (Food and Drug Administration, 2019). The usage of sulfanilamide elixir containing diethylene glycol as the solvent in 1937 claimed 107 lives in the USA (Yawson, Abekah-Nkrumah, Okai and Ofori, 2022). The manufacturing companies were not aware of the solvent's toxicity at the time, but it was thought to be the cause of

the deaths. In order to reform the public health system, the Federal Food, Drug, and Cosmetic Act was created in 1938. The body introduced the possibility of conducting factory inspections and mandated the demonstration of drug safety prior to market approval (Yuzuki, 2019). In 1938, Douthwaite's theory 1938 pointed that Acetylsalicylic acid (ASA), may result in melena and diverse conclusions came from studies on the toxicity of ASA in the gastrointestinal tract. ASA is currently not recommended for usage in individuals with gastrointestinal ulcers because to the 1955 discovery that it can cause gastrointestinal disorders (Chandran, Dharman, and Dharan, 2021). Soldiers at the time used Thalidomide to help them sleep better because many of them had been exposed to the horrific realities of war. Thalidomide was a highly effective sedative and tranquilizer that was quickly approved in early 1950s to treat morning sickness in pregnant women. A few years later, instances of infants born with abnormalities began to multiply until an Australian physician wrote a letter in *The Lancet* in 1961, establishing a link between the use of Thalidomide and fetal harm (Nurmala, 2022). As a result of this tragedy, the pharmacovigilance system underwent considerable modifications, with the spontaneous reporting of adverse medication reactions becoming systematic, organized, and regulated. All the components required to generate, spontaneous reporting and demonstrate the causal relationship between the adverse event and the medication were already present in the letter (Chandran, Dharman, and Dharan, 2021). The Thalidomide disaster prompted a thorough revision of laws that mandated premarketing medication test for both safety and efficacy in the US in 1962 and many other nations. Despite its past notoriety, thalidomide has recently been more effective for treating leprosy, vascular abnormalities, and some types of cancer (Woolf, 2022). The modification requirements for premarketing medicine approval is teratogenicity tests performed on 3 separate animals required to be added to the safety data (Fornasier, Francescon, Leone and Baldo, 2018). Germany, the United States, the United Kingdom, Australia, Sweden, Ireland, Canada, Denmark, Netherland, and Switzerland were first ten countries to join the WHO Program for International Drug Monitoring when it was created (WHO, 2020).

In Nigeria, the process of increasing medication safety started in 1980s and 1990s initially at a tertiary hospital with preparatory activities at the national level. Nigeria became a member of WHO Program for International Drug Monitoring (PIDM). Hence, the establishment of: National Agency for Food and Drug Administration and Control (NAFDAC) by Decree 15 of 1993 (Act Cap N1 laws of the Federal Republic of Nigeria 2004), Nigerian National Drug Policy 2005 and Nigerian pharmacovigilance policy paper in 2012 (Opadeyi, Fourier-Réglat, and Isah, 2018). National Drug Safety and Advisory Committee (NDSAC), was established in 2006 to provide expert opinion on pharmacovigilance-related issues including, post-marketing surveillance. The pharmacovigilance unit was elevated to an independent directorate in 2012 and separated from the Food and Drug Information Centre (FDIC) with the formation of zonal centers in 2012 to cover the country's six geopolitical zones. These centers aid in the expansion and improvement of pharmacovigilance activities in Nigeria. Since the country's NPC was established, it has

acted as a repository for reported adverse drug reactions and maintained contact with pertinent global organizations for pharmacovigilance activities, including the World Health Organization (WHO), the European Medicines Agency (EMA), and FDA. The nation's ADR reports are collected, processed, evaluated, and handled by the NPC center in Abuja. Utilizing the VigiFlow software and the VigiBase data system, these reports are evaluated and verified in accordance with WHO standards before being transmitted to the WHO Uppsala Monitoring Center [Adedeji WA, Adegoke AB, Fehintola FA (2021)]

The Boston Collaborative Drug Surveillance Program began with a pilot study in 1966. This program had a crucial role in the development and use of techniques in drug epidemiology since it was the first to conduct epidemiological research to quantify the possible adverse effects of drugs utilizing hospital monitoring (Chandran, Dharman, and Dharan, 2021). The "Yellow card" (YC), a specific form designed for gathering spontaneous reports of drug toxicity, was introduced in UK in 1964 (Sachdev, Greg, Singh, and Mehrotra, 2020). Drug safety concerns were strengthened, systematized, and brought to a global scale at this time.

Evaluation and Reporting of ADRs in Hospital Settings

A number of reasons, including the severity and complexity of the disease, polypharmacy, enthusiastic prescription, potential negligence and medication interactions, contribute to the high frequency of ADR events in hospital settings. According to Yadesa, Kitutu, Tamukong, and Alele (2020), patients with polypharmacy—the concurrent use of five or more medications—had noticeably higher probabilities of developing an ADR while hospitalized than those in the control group. ADR prevalence was found to be 22% among hospitalized older individuals in the most recent systematic analysis, with rates of 19% in high-income countries and 29% in low-income countries (Yadesa, Kitutu, Deyno, Ogwang, Tamukong, and Alele, 2021). Emergency admissions owing to ADRs grew by 53.4% in the UK between 2007–2008 and 2014–2015, and the number of bed days used due to ADRs climbed by 51.5% during the same period (Yadesa, Kitutu, Tamukong, and Alele, 2020). ADRs were identified in nearly one-fourth of the respondents in study carried out in Ethiopia on adult hospitalized patients by Senekie, Netere, Tesfaye, Dagnaw, and Belachew (2023). ADRs were more likely to be encountered in patients who used more drugs, patients with co-morbidities and difficulties, and older patients. ADRs are more common among admitted patients due to an increase in the availability of new drug classes, according to studies (Chandrabhan and Jain, 2021). Mostly, 10–20% of hospitalized patients may experience an adverse drug reaction (ADR). This emphasizes the significance of hospital-based ADR monitoring (Senekie, Netere, Tesfaye, Dagnaw, and Belachew, 2023)

Any stage of taking medications, including dispensing, prescription, administration, and monitoring is susceptible to medication errors that result in ADRs. If ADRs are not prevented, they can result in considerable injury, incapacity, and even death. In order to ensure proper use of medicines, monitoring, and handling at every step of the medication delivery process. The clinical and laboratory manifestations of ADRs should be closely

monitored by the on-call medical staff in order to properly plan patient management. Programs for ADR reporting and monitoring can aid in identifying and evaluating the dangers connected to drug use. It is crucial to build a comprehensive strategy for evaluating medication safety, which includes active surveillance, data, severity, collection and assessment of drug incidence and types of adverse events.

In a Federal Government Hospital in Nigeria, Mweetwa, Witika, Tshiamo, Adiukwu, Kenaope, Oluwabusola and Makoni, (2021) conducted a study that found some barriers to ADR reporting for healthcare professionals, including awareness, the potential benefits of ADR reporting, and a lack of clarity regarding ADR reporting in relation to their professional responsibilities. Healthcare practitioners noted that reporting cases is challenging in Nigeria due to the lack of information accessible for ADR reporting. To improve ADR-related health care in Nigeria, appropriate training and education on pharmacovigilance and the importance of PV reporting should also be provided. Increase in under-reporting behavior in healthcare settings is ultimately caused by a deteriorated documentation infrastructure for spontaneous adverse drug reaction reporting methods (Alemu and Biru, 2019). In their empirical findings, Haines, Meyer, Summers and Godman (2020) came to the conclusion that there is a serious gap in the reporting of adverse drug reactions. These gaps can be seen in the underreporting of ADRs and are accompanied by glaring deficiencies in knowledge, attitude, and perception regarding the reporting of adverse drug reactions. The tendency to report adverse medication reactions is negatively impacted by a variety of factors. The three criteria that all participants had in common were "not knowing how to report," "not knowing where to report ADRs," and "not knowing when to report adverse drug reactions." The risk that the report would be inaccurate was one of the main factors preventing ADR reporting.

About 69.1% of healthcare professionals are unaware of Turkey's national pharmacovigilance center, which is one of the study's limitations. Nearly 87.5% (range: 69.3-100%) of healthcare professionals said they never reported an adverse drug reaction before during their practice, and about 37.5% (range: 7.1-75.7%) said they did not think it is important to report ADRs. Lack of time, ambiguity, and not knowing where to report were the three most often mentioned challenges to pharmacovigilance (Khan, Karatas, Martins, Jamshed and Rahman, 2021). There is minimal data on the prevalence of adverse drug reactions (ADRs) in hospitals and the drugs that cause them in underdeveloped nations like Nigeria. This is due to the ineffectiveness and underutilization of the evaluation and reporting medium in Nigeria by Nigerians, including HCPs and healthcare providers. Because it might be difficult to determine with certainty the probable causal relationship between a medicine and an adverse reaction (causality assessment), HCPs occasionally fail to report ADRs. The key goal that still needs to be accomplished is institutionalizing pharmacovigilance in Nigerian healthcare facilities, both at the state and federal levels. More capacity building is required to teach HCPs how to evaluate suspected ADRs. ADRs associated with herbal medicines, which are commonly utilized by the Nigerian people, also need to be categorized and evaluated. As patients are significant players in achieving

spontaneous ADR reporting, a global phenomenon and the cornerstone of pharmacovigilance activity, underreporting is also a result of a lack of active patient involvement in the reporting system. As a result, it is necessary to assess and improve their impact (Adisa and Omitogun, 2019).

All ambulatory care healthcare practitioners should be required to complete clinical training in adverse drug reaction reporting as part of their undergraduate clinical education. There is a major knowledge gap regarding Turkey's national pharmacovigilance system. Based on the results of their investigation, they came to the conclusion that a large gap exists in the timely reporting of adverse medication reactions due to a number of variables, including a lack of knowledge of the national pharmacovigilance center being the most prominent (Opadeyi, Fourrier-Réglat, and Isah, 2018).

Based on the aforementioned findings, it is strongly advised that Nigerian healthcare professionals integrate pharmacovigilance education and training in their curriculum. Additionally, all ambulatory care healthcare providers should consider adverse drug reaction reporting to be a crucial component of their undergraduate clinical training. Adequate knowledge and reasonable prescribing practices can greatly lower the rate of adverse drug reactions as patients' needs have changed from the immediate treatment of acute problems to the long-term management of chronic health disorders. Because of this, the prescribing practices of healthcare professionals must be based on rational pharmacotherapy methods, which include the selection of appropriate medications at ideal doses and durations, taking into account efficient and safe treatment alternatives, and giving patients the most recent information on their diagnosis and treatment. The risk versus benefit ratio of drugs is significantly influenced by several factors. A crucial stage in the process of rational pharmacotherapy is to adequately inform patients about their medicine, including the dose, usage instructions, warnings, adverse effects, and more (Sharif, Kazi, and Rweyemam, 2021).

Communication in Pharmacovigilance

A better healthcare management system is controlled by effective communication. Effective communication in pharmacovigilance entails the dissemination of information accompanied by evidence that has been gathered, assessed, and used to prompt a suitable response or alert. Information can travel from patients to healthcare professionals, then to pharmaceutical companies, and finally to health authorities thanks to communication. In the Uppsala Monitoring Committee, effective communication is essential for raising awareness of the value of pharmacovigilance around the world and improving the reporting of adverse drug reactions. Therefore, it is essential for people to be knowledgeable and vigilant, contributing through strong and efficient communication, in order to ensure the safer administration of medications. This can be accomplished by holding appropriate training sessions, lectures, and conducting social science-based research, giving consumers and patients a better and more efficient platform for reporting ADRs and the flow of information to health authorities (Tapan, 2020). Pharmacovigilance experts from all over

the world release updates on drugs safety guidelines through active, timely, and effective communication. With the following claims, effective communication assists in the development of safety guidelines: sufficient collection, assessment, and easy accessibility of safety information on all drug molecules by each country.

Theoretical Review

The Theory of Planned Behavior (TPB)

The theory of planned behavior was used in this study to build on earlier research on healthcare professionals reporting of ADRs in military and paramilitary Hospitals in Enugu State. TPB, a cognitive theory put forth by Azjen in 1985, a person's choice to engage in a particular activity can be anticipated by their desire to do so. A well-known psychosocial theory called the TPB emphasizes motivational factors as predictors of the likelihood of engaging in particular activity. The TPB states that intention is the immediate forerunner to conduct and shows how prepared a person is, to engage in an activity. It is considered that intentions reflect the driving forces behind behavior, reflects the amount of effort individuals are willing to put out when engaging in the behavior. In general, an action is more likely to be executed the stronger the intention to engage in it. To improve ADR reporting, it may be helpful to understand elements that are linked to the attitude to report ADRs. In TPB discussed above, three important independent variables Attitude (ATT) toward the conduct, subjective norm (SN), and perceived behavioral control (PBC) are the main factors that influence intention. Attitude refers to the extent to which individuals have a favorable or unfavorable assessment of the behavior in question. The theory is relevant because it explains the reason of variations of healthcare professionals' knowledge and attitudes to ADR.

Empirical Review

It was found that 99% of the respondents knew what pharmacovigilance was supposed to mean. 58.7% of respondents believe that ADR reporting should be required while 67% had encountered cases of ADR in their practice, 26% had reported cases of ADRs. The research noted that the participants were aware of ADR and had sound knowledge and a positive attitude towards ADR reporting, but the actual practice of reporting was low among the healthcare professionals included in a study carried out in Abuja, Nigeria on knowledge, attitudes and reporting procedures of doctors, pharmacists, and nurses in selected health facilities (Danraka, Usman and Onavbavba, 2021).

A study was conducted evaluating the pharmacovigilance and adverse drug reaction (ADR) reporting procedures of healthcare personnel at King George Hospital in Visakhapatnam. This cross-sectional study utilized a validated questionnaire that was distributed to randomly selected healthcare professionals (n=350), including doctors, pharmacists, and nurses. The completed questionnaires were collected and analyzed. Out of the 350 questionnaires circulated, a total of 250 healthcare professionals responded, including 100 doctors, 100 nurses, and 50 pharmacists. The overall enrollment rate for the study was

approximately 75.4%. The study revealed that healthcare professionals had inadequate knowledge about the concept and process of pharmacovigilance and the spontaneous ADR reporting system (Chandran, Dharman, and Dharan, 2021). However, they exhibited a positive attitude towards pharmacovigilance, albeit with limited experience in reporting. The study highlighted a lack of knowledge and awareness of pharmacovigilance and ADR reporting among healthcare professionals in the hospital (Sujatha, Padmaja, Sreenivas, Supriya, Saran and Bindu, 2019).

ADR reporting, awareness, knowledge, and attitudes among HCPs in Ghana. Data was analyzed using frequencies and percentages and the result indicated that approximately 82.8% of the HCPs encountered ADR incident, but only 52.6% of them reported such incidents. Pharmacists were the most likely group to report ADRs, accounting for 66.7% of the reports. The study also revealed that about 85.8% of HCPs were aware of ADR reporting procedures and displayed positive attitudes towards them. However, the knowledge of HCPs regarding ADR reporting was found to be low, indicating a need for training in this area. The conclusion drawn was that healthcare managers and regulators should address existing gaps in awareness, attitudes, and knowledge of HCPs regarding ADR reporting structures and procedures (Yawson, Abekah-Nkrumah, Okai and Ofori, 2022).

Doctors' and pharmacists' knowledge, attitudes, practices, and factors related to ADR reporting at secondary and tertiary hospitals in Islamabad was investigated. The majority of respondents (83.1%) indicated poor knowledge of ADR reporting. However, a significant percentage (78.2%) showed a positive attitude towards ADR reporting, while only a few hospitals (12.3%) demonstrated good ADR reporting practices (Nisa, Zafar and Sher, 2018). In a descriptive cross-sectional study among HCPs in community healthcare centers and primary healthcare (PHC) clinics in the Tshwane Health District, Gauteng Province, South Africa, the knowledge, attitude, and practice of HCPs regarding ADR reporting was assessed. Two hundred responses were collected out of 218 questionnaires distributed. The study found that although there was a positive attitude towards ADR reporting but the act of reporting was low (16.0%). A significant proportion of respondents was not aware of, where, or when to report ADR (60.5%). More than half of the respondents mentioned that their clinical knowledge made it difficult to know whether an ADR had occurred (51.5%). The study concluded that there was under-reporting of ADRs and gaps in knowledge, attitude and practice among HCPs. It emphasized the need for training and education on ADR reporting in South Africa (Haines, Meyer, Summers and Godman, 2020).

A cross-sectional study in a tertiary hospital in Malaysia where a 40-item self-administered questionnaire was utilized in the course of the study, Specialists, medical officers, house officers, and nurses from the Hospital Tuanku Ja'afar in Seremban, Malaysia, were among the attendees. Only 37.8% of the respondents demonstrated ideal practices, whereas 56.9% showed adequate knowledge. About one-fifth of the participants showed barriers to attitudes, whereas 40.71% showed positive attitudes about the drivers of ADR reporting. The study discovered that professionals with more expertise had better practices and fewer unfavorable attitudes. The study concludes that healthcare professionals at the tertiary

healthcare center in Malaysia had satisfactory knowledge but poor practices due to perceived barriers in the ADR reporting process (Burud, Daher, Din, Agarwal, Zakaria and Agarwal, 2021).

A cross-sectional study was conducted and the findings revealed that most pharmacists were aware of the concept and functions of PV (96.5% and 87.2%, respectively). However, there was inadequate knowledge about the overall PV field, with incorrect or incomplete answers recorded for questions related to independent ADRs treatment, augmented drug reaction, the international location of ADRs, and the World Health Organization's "online database" for reporting ADRs. Despite this, a positive attitude was observed, with 96.9% of pharmacists expressing interest in ADR reporting and acknowledging its importance for safe drug usage. The main barriers to reporting ADRs were reported as unavailability of information about ADRs, lack of awareness about the need to report ADRs, and lack of time. In terms of practice, 69.2% of pharmacists reported receiving training in ADR reporting, and 70% reported having reported ADRs more than once a week (AL-Mutairi, AlFayyad, Altannir and Al-tannir, 2021).

In 2021 a systematic literature review to examine the knowledge, attitude and pharmacovigilance practices of healthcare professionals in Sub-Saharan Africa was conducted. The review included seven studies published between 2010 and 2020. The studies highlighted factors such as under-reporting, inadequate training, knowledge assessment, practice, and attitude. The review found that healthcare professionals in sub-Saharan Africa lack expertise in pharmacovigilance practices due to factors such as unavailability of support and lack of awareness. The review recommended organizing education, training, and role-play sessions to improve pharmacovigilance practices among healthcare professionals in the region (Mweetwa, Witika, Tshiamo, Adiukwu, Kenaope, Oluwabusola and Makoni, 2021).

Yemeni pharmacists' knowledge, attitudes, and practices regarding adverse drug reactions (ADRs) reporting systems and identify barriers preventing them from reporting was evaluated, the findings showed that 156 pharmacists (96.3%) did not realize that Yemen has a system for reporting adverse drug reactions. The pharmacists' collective knowledge score was 1.2 (SD = 1.2) out of 7. Regarding practice, 140 pharmacists (87.0%) disclosed that at least one ADR was reported by patients per year. The study found that the majority of pharmacists in Yemen were unaware of the national ADRs reporting system, and it recommended advertising, education, and intensive training to improve awareness and ensure compliance. The main barriers to ADR reporting were inadequate clinical knowledge of pharmacists, the lack of an ADR reporting form, and unawareness of the existence of the national ADRs reporting system (Zawiah, Mukred, Al-Jamei, Kadi, Al-Baidani and Abu Farha, 2019).

A cross-sectional study to assess the factors affecting ADR reporting among HCPs. The study included 102 healthcare professionals, including nurses, health officers, and pharmacy professionals. The data were collected using self-administered questionnaires, and regression analysis was performed to identify factors influencing ADR reporting. The

study found that 47% of participants had inadequate knowledge about ADR reporting, despite the majority (86.3%) having a positive attitude towards it. 51% did not report the ADRs they observed. The study identified a statistically significant association between inadequate knowledge and factors such as lack of ADR reporting training, being a health officer or nurse professional. The study concluded that healthcare professionals exhibited inadequate knowledge and practice regarding ADR reporting, despite having a positive attitude (Seid, Kasahun, Mante and Gebremariam, 2018).

Methodology

Design of the Study

The study is a cross-sectional survey conducted at the Military and Paramilitary Hospitals in Enugu.

Area of the Study

The study covered healthcare professionals in Enugu State specifically, military and paramilitary hospitals namely; 82 DMSH Nigerian Army, 556 BMC Nigerian Airforce, Nigerian Police Force and Nigerian Correctional Service. The 82 Division Medical Services and Hospital (DMSH) is in Abakpa military cantonment along the Enugu-Abakaliki Road in Enugu-East Local Government Area of Enugu state, Nigeria. The 556 Base Medical Center (BMC) is part of the Airforce base along the Enugu-Onitsha expressway in Abakpa in Enugu-East local government area of Enugu state, Nigeria. The Nigerian Correctional Service in Enugu was founded in 1915 and is situated at 6/24 Kingsway Road, Enugu. It is one of the most well-known prisons in the Eastern region and can house up to 638 convicts. Nigerian Police Clinic Enugu is situated in GRA West, Enugu North Local Government, Enugu State. It was founded on December 6, 1976, and is accessible around-the-clock.

Population of the Study

The population of the study consists of healthcare professionals namely: doctors, pharmacists and nurses working in the facilities of military and paramilitary earlier stated.

Sample and Sampling Techniques,

Simple random technique was used to select 98 respondents from the 130 HCPs working in Enugu's Military and Paramilitary Hospitals earlier stated using Taro Yamane formula

$$n = \frac{N}{1+N(e)^2}$$

Where;

n = sample size

N = population for the study

e = 0.05 margin error

1 = unit constant

N = 130

Then,

$$n = \frac{130}{(1 + 130(0.05)^2)}$$

$$n = 98$$

Sample size = 98 and 22 respondents were selected using non-probability. Hence, we have a sample size of 120 respondents.

Sources of Data

Data used in the study was sourced basically through primary source by administration of structured questionnaire in line with the research questions.

Reliability of the Instrument

Using the test-retest method, the instrument's reliability was evaluated. In the 82 Division Medical Services and Hospital in Enugu, 20 respondents were given the same questionnaire.

The same set of people who took the prior test were given the same test two weeks later. Two sets of test results were acquired, and the Cronbach's alpha (α) was computed using these results. The final score of 0.845 showed that the instrument was reliable and sufficient for the investigation.

Method of Data Analysis

Regression analytic precisely, binary logistic regression tool was employed in the data analysis with the aid of Statistical Package for the Social Sciences (SPSS) version 20.

Data Presentation

The results in Table 1 (see appendix) showed the percentage responses on the HCPs demographics. According to responses about the category of healthcare professional, out of the 112 HCPs in the survey, 22.3% were doctors, 12.5% were pharmacists, and 65.2% were nurses. The table shows that nurses make up a larger percentage of HCPs. Responses on the number of years spent practicing in the field, 48.2% had practiced for one to five(1-5 years), 24.1% had practiced for six to ten(6-10) years, and 27.7% had practiced for more than ten(10) years. As revealed in the table, A higher proportion of HCPs had been in practice for 1 to 5 years. Responses on the HCPs' places of work, 9.8% of them work in the Nigerian Air Force, 63.4% work in the Nigerian Army, 4.5% work in the Nigerian Correctional Service, and 22.3% work in the Nigerian Police Force. The Nigerian Army employs a larger portion of the HCPS, as shown in the table.

Data Analysis

Hypothesis 1

Ho: There is no significant relationship between demographic data of HCPs and their level of knowledge on pharmacovigilance.

Hi: There is significant relationship between demographic data of HCPs and their level of knowledge on pharmacovigilance.

Alternate hypothesis is accepted given the P- value of $0.027 < 0.05$ and null hypothesis is rejected therefore, it is concluded that there is significant relationship between demographic data of HCPs and their level of knowledge on pharmacovigilance.

Hypothesis 2

Ho: There is no significant relationship between demographic data of HCPs and their attitude towards pharmacovigilance and ADR reporting.

Hi: There is significant relationship between demographic data of HCPs and their level of knowledge on pharmacovigilance.

Alternate hypothesis is accepted since p-value of $0.010 < 0.05$ tabulated and the null hypothesis is thus, rejected. Hence, it is asserted that there is significant relationship between demographic data of HCPs and attitude towards pharmacovigilance and ADR reporting.

Discussion of Findings

These findings are significant because the practice of pharmacovigilance among healthcare professionals in military and paramilitary hospitals is still at a primitive stage. Literature suggests that the understanding of pharmacovigilance among HCPs directly impacts the frequency of reporting ADRs. Therefore, this study was conducted to evaluate the knowledge, attitude, and practice of ADR reporting among HCPs working in military and paramilitary hospitals in Enugu. In Table 1, The HCPs' demographics were presented, including their occupation, number of years of experience, and place of employment. Nurses made up a majority of responses (65.2%), followed by doctors (22.3%) and pharmacists (12.5%). The Nigerian Army was the most common place of employment (63.4%), and the majority of HCPs (48.2%) had been in practice for one to five years. These results are in line with those of another study by Danekhu, Shrestha, Aryal, and Shankar (2021), which indicated that 78% of the respondents were nurses, 14.9% were doctors, and 7.1% were pharmacists, as well as Shanko and Abdela (2018). Nurses made up a greater percentage of the participating healthcare workers (56.8%), according to Siraj, Shafi, Ejeta, Feyisa, Kebede, and Hassen (2022). whereas doctors made up 22.6% of the total and pharmacists made up 16.8%. In contrast, Sharif, Kazi, and Rweyemam (2021) reported that the distribution was made up of 19.1% other scant number of pharmacists included in this study could be a factor in the subpar practice of reporting ADR. Hospital pharmacists have a significant impact on ADR reporting, even if other healthcare professionals (HCPs) make a contribution. Pharmacists can ensure medication safety by identifying ADRs and reporting them in addition to preventing them. Given the prevalence of nurses in hospitals, ADR reporting ought to be incorporated into their regular workday. In order for nurses to do their role properly, they should get the necessary scientific training. Increasing nurses' involvement in the reporting of ADR can improve patient safety and lower the expense of

ADR treatment complications Knowing enough about ADRs is essential for reporting them. HCPs must be knowledgeable in ADRs and the processes involved in reporting them. The finding indicated that the level of knowledge of HCPs on pharmacovigilance was 75.9% while 24.1% had poor knowledge on pharmacovigilance and ADR reporting. Our findings are in line with: Daniel (2021) with 58.3% of medical staff in Katsina State, Nigeria's public hospitals displayed high levels of knowledge, Sharif, Kazi, and Rweyemam (2021), Nisa, Zafar, and Sher (2018),

The study finding showed that most HCPs (86.6%) had a positive attitude toward reporting ADRs and pharmacovigilance, while 13.4% had a negative view. The finding was supported by Nisa, Zafar, and Sher (2018), Siraj, Shafi, Ejeta, Feyisa, Kebede, and Hassen (2022), Tekel, Bekalu, and Sema (2021) and Seid, Kasahun, Mante, and Gebremariam (2018). However, our finding differs from the finding of; Adisa and Omitogun (2019).

Summary of Findings

The finding indicated that the level of knowledge of HCPs on pharmacovigilance was 75.9% while 24.1% had poor knowledge on pharmacovigilance and ADR reporting. .

The study showed that most HCPs (86.6%) had a positive attitude toward reporting ADRs and pharmacovigilance, while 13.4% were a negative.

Conclusion

Demographic characteristics such as professional designation, years of experience, and workplace setting significantly influence the likelihood of ADR reporting among HCPs. Pharmacists, for instance, are more inclined to report ADRs compared to doctors and nurses, possibly due to their specialized training and familiarity with pharmacovigilance processes. Similarly, HCPs with longer years of experience in their profession exhibit higher reporting rates, indicating a positive correlation between experiences and reporting behavior.

The study came to the conclusion that the level of HCPs knowledge on adverse drug reactions (ADRs) in military and paramilitary hospitals is significant. The participants had adequate understanding of ADRs and the organization in charge of pharmacovigilance and ADR reporting. Furthermore, Healthcare practitioners' attitudes are thought to be crucial for ADR reporting since a positive attitude may encourage prompt reporting. The attitude of HCPs in reporting ADRs was impressive. However, some HCPs observed ADRs in patients but chose not to report them and there are gaps in the knowledge of specific reporting forms and methods.

Overall, our findings emphasize the need for targeted interventions aimed at addressing demographic disparities in ADR reporting. Strategies such as tailored training programs, increased institutional support, and the implementation of user-friendly reporting systems can help mitigate barriers and foster a culture of pharmacovigilance across diverse demographic groups of healthcare professionals. By recognizing and addressing the multifaceted influences of demography on ADR reporting, healthcare institutions can

enhance patient safety outcomes and contribute to the continuous improvement of drug safety monitoring practices.

Recommendations

Based on the findings of this research, the following recommendations are proposed for healthcare professionals in Military and Paramilitary hospitals in Enugu

1. Improving Training Programs: it is important to provide healthcare professional especially in the military and paramilitary facilities regardless of positions or place of employment, with thorough education on pharmacovigilance and ADR reporting. This will bridge the knowledge gap that has been found.
2. Fostering a culture of ADR Reporting amongst healthcare professionals in these hospitals; by raising the recognition of the importance of reporting both tolerable and moderate ADRs as well as previously unknown or severe ADRs, this strategy aims to promote a culture of ADR reporting. Create initiatives to reward and recognize medical personnel who regularly and promptly report ADRs.

Conflicts of Interest

To the best of our knowledge, there are no conflict of interest in terms of financial support or any other form.

References

- [1] Adedeji WA, Adegoke AB, Fehintola FA (2021) Adverse drug reactions reporting practice and associated factors among community health extension workers in public health facilities, Southwest, Nigeria. *Pan Afr Med J.* 2021 Nov 17;40:165. PMID: 34970407; PMCID: PMC8683451. <https://doi.org/10.11604/pamj.2021.40.165.28574>
- [2] Adisa, R. and Omitogun, T.I. (2019) 'Awareness, Knowledge, Attitude and Practice of Adverse Drug Reaction Reporting among Health Workers and Patients in Selected Primary Healthcare Centres in Ibadan, Southwestern Nigeria'. *BMC Health Services Research*, 19(1), p. 926. <https://doi.org/10.1186/s12913-019-4775-9>
- [3] Aimer, O. (2020). History overview of Pharmacovigilance. Historical Overview of Pharmacovigilance RxCourse Institute Inc. <https://www.rxcourse.com/historical-overview-of-pharmacovigilance/>
- [4] Alemu KB, Biru TT (2019). Health care professionals' knowledge, attitude, and practice towards adverse drug reaction reporting and associated factors at selected public hospitals in Northeast Ethiopia: a cross-sectional study. *BioMed research international*: 1-11. <https://doi.org/10.1155/2019/8690546>
- [5] AL-Mutairi, A., AlFayyad, I., Altannir, Y. and Al-tannir, M., (2021). Medication safety knowledge, attitude, and practice among hospital pharmacists in tertiary care hospitals in Saudi Arabia: a multi-center study. *Arch Public Health* 79, 130. <https://doi.org/10.1186/s13690-021-00616-1>
- [6] Bepari, Asmatanzeem & Niazi, Shaik K. & Rahman, Ishrat & Dervesh, AsmabiMakandar. (2019). the comparative evaluation of knowledge, attitude, and practice of different health-care professionals about the pharmacovigilance system of India. *Journal of Advanced Pharmaceutical Technology & Research*. <https://doi.org/10.68.10.4103/japtr.JAPTR.4.19>

- [7] Burud I, Daher AM, Din HB, Agarwal P, Zakaria J, Agarwal R. (2021) Knowledge, attitudes, and practices related to adverse drug reaction reporting by healthcare professionals in a tertiary hospital in Malaysia. *J Appl Pharm Sci*; 11(10): 079-087. <https://doi.org/10.7324/JAPS.2021.1101011>
- [8] Chandran,C, Dharman, D and Dharan, S.(2021). A review on adverse drug reaction and its historical background. *World Journal of Pharmaceutical Research* Volume 10, Issue 7, 196-211. ISSN 2277-7105. DOI: 10.20959/wjpr20217-20717
- [9] Chandrabhan Jain P, and Jain S. (2021). Adverse drug reaction monitoring study in hospitalized patients: support for pharmacovigilance at a tertiary care hospital. *International Journal of Basic & Clinical Pharmacology*, 10(3), 261-265. 21. Wu C, Bell CM, Wodchis WP. <https://doi.org/10.18203/2319-2003.ijbcp20210554>
- [10] Daniel, A. (2021). Adverse Drug Reactions Reporting among Health Professionals in Government Hospitals in Katsina State, Nigeria. *TEXILA INTERNATIONAL JOURNAL OF PUBLIC HEALTH*, 9(3),10-23. <https://doi.org/10.21522/TIJPH.2013.09.03.ART002>
- [11] Danraka, Usman and Onavbavba (2021). Assessment of Knowledge, Attitude and Practice of Adverse Drug Reaction Reporting Amongst Healthcare Workers in Selected Health Facilities in Abuja. 11. 2021. 10.7176/JBAH/11-8-05. *Journal of Biology, Agriculture and Healthcare* www.iiste.org ISSN 2224-3208 (Paper) ISSN 2225-093X (Online), Vol.11, No.8
- [12] Food and Drug Administration (2019) The 1906 Food and Drugs Act and Its Enforcement <https://www.fda.gov/about-fda/changes-science-law-and-regulatory-authorities/part-i-1906-food-and-drugs-act-and-its-enforcement>
- [13] Fornasier G, Francescon S, Leone R, Baldo P (2018). An historical overview over Pharmacovigilance. *International Journal of Clinical Pharmacy*. Aug;40(4):744-747. PMID: 29948743; PMCID: PMC6132952. <https://doi.org/10.1007/s11096-018-0657-1>
- [14] Haines, H.M., Meyer, J.C., Summers, R.S. Godman, B.B. (2020) Knowledge, attitudes and practices of health care professionals towards adverse drug reaction reporting in public sector primary health care facilities in a South African district. *Eur J Clin Pharmacol* 76, 991-1001. <https://doi.org/10.1007/s00228-020-02862-8>
- [15] Hussain R, Hassali MA, Hashmi F, Akram T. (2021). Exploring healthcare professionals' knowledge, attitude, and practices towards pharmacovigilance: A cross-sectional survey. *J Pharm Policy Pract*. 14(1): 1-3. <https://doi.org/10.1007/s00228-020-02862-8>
- [16] Kefale B, Degu A, Tegegne GT (2020) Medication-related problems and adverse drug reactions in Ethiopia: a systematic review. *Pharmacol Res Perspect*; 8(5): e00641. <https://doi.org/10.1002/prp2.64111>
- [17] Khan,z,Karatas,Y., Maria Auxiliadora Parreiras Martins, Shazia Jamshed & Hazir Rahman (2021) Knowledge, attitude, practice and barriers towards pharmacovigilance and adverse drug reactions reporting among healthcare professionals in Turkey: a systematic review, *Current Medical Research and Opinion*, 38:1, 145-154, DOI: <https://doi.org/10.1080/03007995.2021.1997287>
- [18] Mweetwa, LL, Kenaope TJ, Mosala, B, Pule, K, Obure, GJ, Mothibe G, Tshiamo, KO, Oluwabusola, ET. (2021) Examining characteristics, knowledge, attitude and practice of pharmacovigilance by health care professionals in sub-Saharan Africa: a systematic review of the literature. Vol. 15, No. 8, 152-163 ref. 24 ref. ISSN (Electronic): 1996-0816. DOI: 10.5897/AJPP2021.5254 URL: <https://academicjournals.org/journal/AJPP/article-abstract/E7E277C67591> <https://doi.org/10.5897/AJPP2021.5254>
- [19] Mweetwa LL, Witika BA, Tshiamo KO, Adiukwu PC, Kenaope TJ, Oluwabusola ET and Makoni P.,A. (2021) Investigating the Impact of Existing Pharmacovigilance Systems in Africa and How They Influence Adverse Drug Reaction Reporting by Nurses, Doctors and Pharmacists Working in

- Federal Government Hospitals - A Case Study of Nigeria J. Pharmacovigil. 9:314.
<https://doi.org/10.35248/2329-6887.21.9.314>
- [20] Nadew SS, Beyene KGM, Beza SW (2020) Adverse drug reaction reporting practice and associated factors among medical doctors in government hospitals in Addis Ababa, Ethiopia. PLoS One. 2020 Jan 21; 15(1): e0227712. <https://doi.org/10.1371/journal.pone.0227712>
- [21] Nisa Z, Zafar A, Sher F. (2018). Assessment of knowledge, attitude and practice of adverse drug reaction reporting among healthcare professionals in secondary and tertiary hospitals in the capital of Pakistan. Saudi Pharmaceutical Journal;26(4):453461.
<https://ncbi.nlm.nih.gov/pmc/articles/pmc5961757/> <https://doi.org/10.1016/j.jsps.2018.02.014>
- [22] Nurmala.S.(2022) Safeguard people from harmful medicine,Journal of young investigators
<https://jyi.org/blog/tag/medicine>
- [23] Olowofela.A. (2018). Evaluation of pharmacovigilance system performance in South- South Nigeria. Human health and pathology. Université de Bordeaux, 2018. English.ffNNT: 2018BORD0456ff. fftel-02080130f
- [24] Opadeyi, A.O., Fourrier-Réglat, A. and Isah, A.O. (2018) 'Assessment of the State of Pharmacovigilance in the South-South Zone of Nigeria Using WHO Pharmacovigilance Indicators'. BMC Pharmacology and Toxicology, 19(1), p. 27. <https://doi.org/10.1186/s40360-018-0217-2>
- [25] Sachdev,R.,Greg,k.,Singh,G., and Mehrotra,V.(2020)Pharmacovilance;An emerging trend in Dental practice in India.Journal of dental science vol 12,issue 1,51-64, Doi: 10.26715/jds.12-1-3
https://doi.org/10.26715/rjds.12_1_3
- [26] Seid, M. A., Kasahun, A. E., Mante, B. M., & Gebremariam, S. N. (2018) Healthcare professionals' knowledge, attitude and practice towards adverse drug reaction (ADR) reporting at the health center level in Ethiopia. International Journal of Clinical Pharmacy, 2018; 40(4), 895-902.
<https://doi.org/10.1007/s11096-018-0682-0>
- [27] Sendekie AK, Netere AK, Tesfaye S, Dagne EM, Belachew EA (2023) Incidence and patterns of adverse drug reactions among adult patients hospitalized in the University of Gondar comprehensive specialized hospital: A prospective observational follow-up study. PLoS ONE 18(2): e0282096. <https://doi.org/10.1371/journal.pone.0282096>
- [28] Sharif,M.,A.,Kazi,A.,A., and Rweyemam,M.,A(2021)Why Pharmacovigilance and Adverse Drug Reaction Reporting Practices Lacks in Developing Countries: A Study from Pakistan.A multifaceted review journal in the field of pharmacy,Sys Rev Pharm; 12(11): 604-610.
- [29] Sujatha, Padmaja,Sreenivas ,Supriya, Saran and Bindu(2019).Assessment of Knowledge, Awareness and Practices among Healthcare Professionals about Pharmacovigilance and Adverse Drug Reactions Reporting In King George Hospital, Visakhapatnam. IOSR Journals.
<https://doi.org/10.9790/0853-1807065967>
- [30] Tahmine Salehi, Naiemeh Seyedfatemi, Mohammad Saeed Mirzaee, Maryam Maleki, Abbas Mardani,(2021) "Nurses' Knowledge, Attitudes, and Practice in Relation to Pharmacovigilance and Adverse Drug Reaction Reporting: A Systematic Review", BioMed Research International, vol. Article ID 6630404, 12 pages, 2021. <https://doi.org/10.1155/2021/6630404>
- [31] Tapan Behl(2020). Role of Communication in Pharmacovigilance, Clinical Research 2020, International Conference on Clinical Research and Case Reports, Paris, France | June 15-16, 03:04
- [32] Tekel MT, Bekalu AF, Sema FD (2021). Knowledge, Attitude, and Practice of Medical, Pharmacy, and Nursing Students Towards Pharmacovigilance and Adverse Drug Reaction Reporting at University of Gondar College of Medicine and Health Sciences, Northwest Ethiopia: A Cross- Sectional Study. Adv Med Educ Pract. 2021 Oct 2; 12: 1129-1139. PMID: 34629925; PMCID: PMC8495138.
<https://doi.org/10.2147/AMEP.S327739>

- [33] WHO (2020) WHO | Pharmacovigilance. WHO. Available at: http://www.who.int/medicines/areas/quality_safety/safety_efficacy/pharmvigi/en/
- [34] Woolf A.D. (2022) Thalidomide tragedy, 1950s, Editor(s): Alan D. Woolf, In History of Toxicology and Environmental Health, History of Modern Clinical Toxicology, Academic Press,2022 Pages 165-175, ISBN 9780128222188, (<https://www.sciencedirect.com/science/article/pii/B9780128222188000582>) <https://doi.org/10.1016/B978-0-12-822218-8.00058-2>
- [35] Yadesa TM, Kitutu FE, Deyno S, Ogwang PE, Tamukong R, Alele PE(2021). Prevalence, characteristics and predicting risk factors of adverse drug reactions among hospitalized older adults: a systematic review and meta-analysis. SAGE Open Med. 2021; 9: 20503121211039099. <https://doi.org/10.1177/20503121211039099>
- [36] Yadesa TM, Kitutu FE, Tamukong R, Alele PE (2020). Predictors of hospital-acquired adverse drug reactions: a cohort of Ugandan older adults. BMC Geriatr. Apr 23;22(1):359. PMID: 35461224; PMCID: PMC9033930. Doi:10.1186/s12877-022-03003-9. <https://doi.org/10.1186/s12877-022-03003-9>
- [37] Yawson AA, Abekah-Nkrumah G, Okai GA, Ofori CG. (2022) Awareness, knowledge, and attitude toward adverse drug reaction (ADR) reporting among healthcare professionals in Ghana. Ther Adv Drug Saf. 2022 Aug 6; 13: 20420986221116468. PMID: 35966898; PMCID: PMC9364224. <https://doi.org/10.1177/20420986221116468>
- [38] Yuzuki D. (2019) The origin of the FDA and the elixir sulfanilamine disaster of 1939; single Genomics. <https://www.linkedin.com/in/daleyukuzi>
- [39] Zainab, A., A. (2020) An Analysis on the Assessment and Reporting of Adverse Drug Reactions in Tertiary Hospitals in Lagos State, South-West Nigeria. Master's thesis, Griffith College. <https://go.griffith.ie/436/>
- [40] Zawiah, M., Mukred, R., Al-Jamei, S., Kadi, T., Al-Baidani, A., & Abu Farha, R. (2019) Pharmacists' knowledge and perceptions about pharmacovigilance and barriers towards adverse drug reactions reporting in Yemen. Journal of Pharmaceutical Health Services Research 10(1), 67-72. <https://doi.org/10.1111/jphs.12257>

Appendix

Table 1: Percentage responses on HCPs demographics

HCPs Demographic Variables	No of Respondents (N=112)	Percentage
Category of healthcare professional		
Doctor	25	22.3
Pharmacist	14	12.5
Nurse	73	65.2
Years of practising in the field		
1-5	54	48.2
6-10	27	24.1
>10	31	27.7
Place of work		
Nigerian Air force	11	9.8
Nigerian Army	71	63.4
Nigerian Correctional Service	5	4.5
Nigerian Police Force	25	22.3

Table 2: Relationship between demographic data of HCPs and their level of Level of knowledge on pharmacovigilance ADR

Demographic Data	Level of knowledge on pharmacovigilance ADR		χ^2	P-value
	Poor (n=81)	Good (n=31)		
Level of knowledge on Pharmacovigilance				
Poor knowledge	24(88.9%)	3 (11.1%)	4.878	0.027
Good knowledge	57(67.1%)	28(32.9%)		
Attitude towards pharmacovigilance and ADR reporting				
Poor attitude	15(100.0%)	0 (0.0%)	10.583*	0.010
Good attitude	66(68.0%)	31(32.0%)		

*Fisher's exact test used