REVIEW ARTICLE

Pharmacovigilance and Adverse Drug Reaction Reporting Activities in the United Arab Emirates: A Scoping Review

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ABSTRACT

The evolution of the pharmacovigilance system in the UAE has been associated with the fast growth of the country. The pharmacovigilance system in UAE was established in the year 2008. In 2013, UAE became a full member of the WHO Programme for International Drug Monitoring. There has been no assessment of published literature on pharmacovigilance and adverse drug reaction (ADR) reporting activities in the UAE. This study aimed at evaluating the ADR reporting and pharmacovigilance system in the UAE based published articles. A literature review was conducted to identify published articles as per PRISMA statement, assessing the pharmacovigilance system and ADR reporting in UAE. PubMed, Scopus, Open Access Journal, and Google Scholar databases were searched using relevant keywords. A total of 18 articles and 2 book chapters were eligible to be included in the review. Formal national pharmacovigilance programs are available under the Ministry of Health. Major challenges related to pharmacovigilance systems are financial and human resources. The results emphasized the critical need for interventions to support ADR reporting activity and to maintain healthcare providers' positive attitudes. The most common factors that can enhance ADR reporting according to this study are encouraging patients to report ADRs, continuing education on ADR monitoring and reporting, and adding ADR reporting topics in the health professions curriculums. While a number of healthcare providers participated in suspected ADR reporting activities, mostly performed without a specific system of reporting. Use of technology must be explored to ensure the ease of spontaneous reporting and subsequent data management.

Keywords: Adverse Drug Reaction (ADRs); Knowledge; Attitude; Practice; Community Pharmacists; Pharmacovigilance; Reporting

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INTRODUCTION

Pharmacovigilance is the science of keeping track of how prescription and over-the-counter (OTC) drugs affect people individually and as a whole. It involves identifying, evaluating, and preventing adverse effects of drugs, and ensuring that the benefits of medication outweigh the risks (1). This includes activities such as collecting and analyzing data on the safety of medications, and identifying potential signals of adverse effects. Pharmacovigilance is essential for maintaining the public's confidence in the healthcare system as well as for ensuring the safe and effective use of medications (2). In addition to identifying and preventing Adverse Drug Reactions (ADRs), pharmacovigilance also helps to increase the overall effectiveness and quality of healthcare by providing information that can be used to optimize the use of medications (3). For example, pharmacovigilance data can be used to identify subgroups of patients who may be more or less likely to experience ADRs, or to determine the optimal dose or duration of treatment for a particular medication (4). ADRs are considered as a major public health concern because they can cause serious harm or even death (5). It is estimated that ADRs contribute to approximately 3-6% of hospital admissions in developed countries (6). Reporting of ADRs to PV centers is important because it helps to identify and understand the risks associated with medications, and can inform efforts to improve patient safety (7). There are different systems for applying pharmacovigilance, one of these systems is spontaneous reporting (SR) (8). The primary goal of the SR system (SRS) is the early detection of new, uncommon and serious ADRs, hence collecting safety data for marked medications (9).

In most countries, there is a pharmacovigilance system in place to ensure that the risks associated with medications are continually monitored and that any necessary actions are taken to protect public health (10). The specific details of pharmacovigilance systems can vary from country to country, but generally they involve the following components: Adverse event reporting,

Data collection and analysis, Risk assessment and Communication (11).

In the UAE, the national pharmacovigilance program was established in 2008, and in 2013, the UAE joined the WHO Programme for International Drug Monitoring as a full member (12). The pharmacovigilance system in the UAE is managed by Ministry of Health and Prevention (MOHAP) and is responsible for monitoring the safety of medications in the whole country (13). MOHAP works with other healthcare regulatory authorities to ensure that medications are safe for use in the UAE (14) (15). The system in the UAE follows a similar process pharmacovigilance system in other countries. On the websites of the Ministry of Health (MOHAP) and other UAE healthcare regulatory bodies, the ADR reporting form is electronically accessible (16). All healthcare providers in the nation, both public and private, were subject to the policy of reporting ADR. The MOH and the UAE's health sectors are currently working to maintain medication safety to the highest standards.

Studies have described pharmacovigilance system in UAE; however, to the best of our knowledge, there have been no focus study evaluating the performance of the pharmacovigilance system in UAE hospitals prior to this time. The goal of this review of the literature is to assess the research that quantifies the level of pharmacovigilance activities and ADR reporting in the UAE's.

This can help in determining the current state of the system used in hospitals and the requirement for education and training on the subject of pharmacovigilance for all healthcare personnel employed in hospitals especially the pharmacists.

By reviewing the available literature in this field, it should be feasible to gain a better understanding of the existing evidence and identify future research requirements. The review will be conducted to retrieve published literature in the field of pharmacovigilance in UAE.

MATERIALS AND METHODS

Study Design

The current review followed the Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines (17).

Eligibility criteria

The literatures covering pharmacovigilance and ADR reporting activities in the UAE that has been published in the English language without time restrictions up to December 31st, 2021, were reviewed and included in the study. The search was only focused on UAE, thus, articles from any other country were excluded. Studies examining adverse events unrelated to medications (such as surgical side effects), allergies, medication errors, abuse, or misuse, medical devices, veterinary products, conventional or alternative medicines, vaccines, and dietary supplements were also excluded.

Data Sources

Three databases were searched to collect the required data. These Databases are: PUBMED, SCOPUS and OPEN ACCESS JOURNAL DATABASES. In addition, GOOGLE SCHOLAR was searched to identify further eligible studies. Rules known as "Boolean Operators" were used during the search process. When possible, duplicate searches were removed by combining the specified keywords with "AND" and the search terms with "OR" (18). The review included journal articles, review papers, letters to editors, conference papers, workshops, conference reviews published and book chapters.

Search strategy:

We used the keywords "Pharmacovigilance" and "UAE" to search for studies using the aforementioned data sources. The other relevant keywords used are: 'Adverse Drug Reactions 'or 'ADRs 'or 'AE 'or 'Adverse Event 'or 'Drug-Induced Reaction 'or 'PV 'or 'Evaluation' and 'UAE '. A search for additional pertinent articles was done in the reference list of the chosen studies. Duplicates were first eliminated using the Mendeley auto deduplication tool (19), and then manually reviewed.

Data collection (Selection of studies)

The title and abstract of studies were evaluated for relevance by the main author (S.SH.). The complete text was examined if there was any doubt regarding the study's eligibility. Two different reviewers (M.J., S.P.) examined the retrieved papers independently to check if they are meeting the inclusion/exclusion criteria. Additionally, minor wording changes were ignored for their precise functional intent. Discussions with a senior reviewer served to resolve any disagreement. Duplication and studies with inadequately reported data were excluded, and the selection process led to the inclusion of 18 studies and 2 book chapters in this review.

Data extraction

Based on information from the studies, the extracted data was created. We gathered the following data from each study we chose: authors, title of the study, year of publication, document type, method of data extraction, study characteristics (study period, study type, study design and sample type), aim, findings, conclusion key-points and limitations. The extracted data were put in to an excel table to make the assessment and analysis processes easier.

Result analysis

The published literature underwent a qualitative analysis, and the results (measured in terms of

number and percentage) were presented in a narrative manner, highlighting commonalities we discovered among the included studies.

RESULTS AND DISCUSSION

Selection process

As shown in Figure 1, the search yielded a total of 27371 records from SCOPUS, PUBMED, and OPEN ACCESS JOURNAL databases, as well as 246000 from Google Scholar. There were 27260 records marked as ineligible by automation tools, 27 duplicated records, and 33 records removed for other reasons. Only 18 studies and 2 book chapters were included after reviewing the full articles. For records returned by a Google Scholar search, a manual screening was performed, and some were excluded due to irrelevant topics (n=4), studies not conducted in the UAE (n=4), and duplicated articles (n=10), resulting in the inclusion of only one study from the Google Scholar database. Finally, there were 18 studies and 2 book chapters included in this review.

General characteristics and sample type of the included studies

Studies on pharmacovigilance and ADR reporting have started to emerge since 2008. The included studies involved different types of samples. Three studies involved all healthcare providers in the country (20) (21) (22). One study involved nurses (23). Another one involved physicians (24). In a study carried out at the level of the Middle East, the sample to respond to a questionnaire regarding the pharmacovigilance system was the head of the pharmacovigilance center in the ministry of health (25). In Ajman (26) and Dubai (13), two studies were conducted among the public. One study was conducted among clinical pharmacists (27). Two studies had pharmacists working in community pharmacies as their samples (28) (29). Other two studies included physicians and community pharmacists (30) (31). First study was published in 2008 and latest one in 2021.

Main Findings

Table I summarizes the characteristics of the included literature on the topic of pharmacovigilance system assessment in the UAE.

Status of Pharmacovigilance System in the UAE

In 2008, Health Authority Abu Dhabi (HAAD) took the initiative to start and implement the Pharmacovigilance (PV) program in the Emirate of Abu Dhabi (20) (32). The Moroccan Pharmacovigilance Centre experts provided 2-weeks training program to the HAAD Pharma / Medicines and Medical Products Department (PHM) staff and health care professionals in both public and private sectors (20). The PV center's activities are concentrated on obtaining reports of suspected drug ADRs, case reports of vaccination, herbal product, medical device, and cosmetic safety issues with little active involvement in providing medication information (25) (16). The UAE has been a full member of the WHO International Drug Monitoring Program in collaboration with the Uppsala Monitoring Centre (WHO-UMC) in 2013 (33) (32). In 2013, Wilbur, K. conducted a study aimed to assess national pharmacovigilance systems in place in the Middle East region and the result of study showed that Six countries including the UAE possess formal national pharmacovigilance programs and only two full-time employees were available to carry out the PV process (25). The "Controls and Requirements of the Good Practices of Pharmacovigilance" were written in 2018 after an agreement was reached between the MOHAP and other national health authorities over the recommendations made by the national pharmacovigilance committee addressing pharmacovigilance (12). This manual's primary goal is to ensure patient safety, it also includes secondary goals that include identifying ADRs, monitoring the safety of medications (especially high-risk medications), avoiding medication errors, and educating and training HCPs on pharmacovigilance (32). Additionally, it was stated that reporting all suspected ADRs is mandatory by all hospitals to the national PV center where an assessment tool to estimate the causality between medication and reported reaction has been done (25) (16). All healthcare practitioners are encouraged to use the standard ADR reporting form, which is available online and is received by MOHAP via paper forms, emails, and smart applications (16) (32). The scores for PV system in UAE were as following: 14 out of 19 for structural indicators, 7 out of 17 for process indicators and 6 out of 12 for impact indicators (34). After receiving ADR reports, there is no framework in place for follow up communication (35).

Pharmacovigilance knowledge

The first stage in assessing healthcare providers' attitudes and practices regarding ADRs reporting is assessing their knowledge of pharmacovigilance and the ADRs reporting process. Most research inquired about PV, ADR definitions, and the local regulatory authority for ADR reporting, but few studies asked about the evaluation of ADR causality, different ADR types, or the online WHO PV database. In general, healthcare professionals in UAE had insufficient knowledge about the local regulatory agency and ADR reporting system. According to a research by John LJ et al (2012) in the Emirates of Ajman, the median score for knowledge components of ADR reporting among nurses working in private teaching hospitals was 11 (total score: 17) (23). A study of 55 physicians working in tertiary care hospitals found that in regard to the knowledge of the ADRs that have to be reported; 97.6% of the participants stated to report serious ADRs, 95% unexpected ADRs, and 88% mentioned that both new ADRs to existing

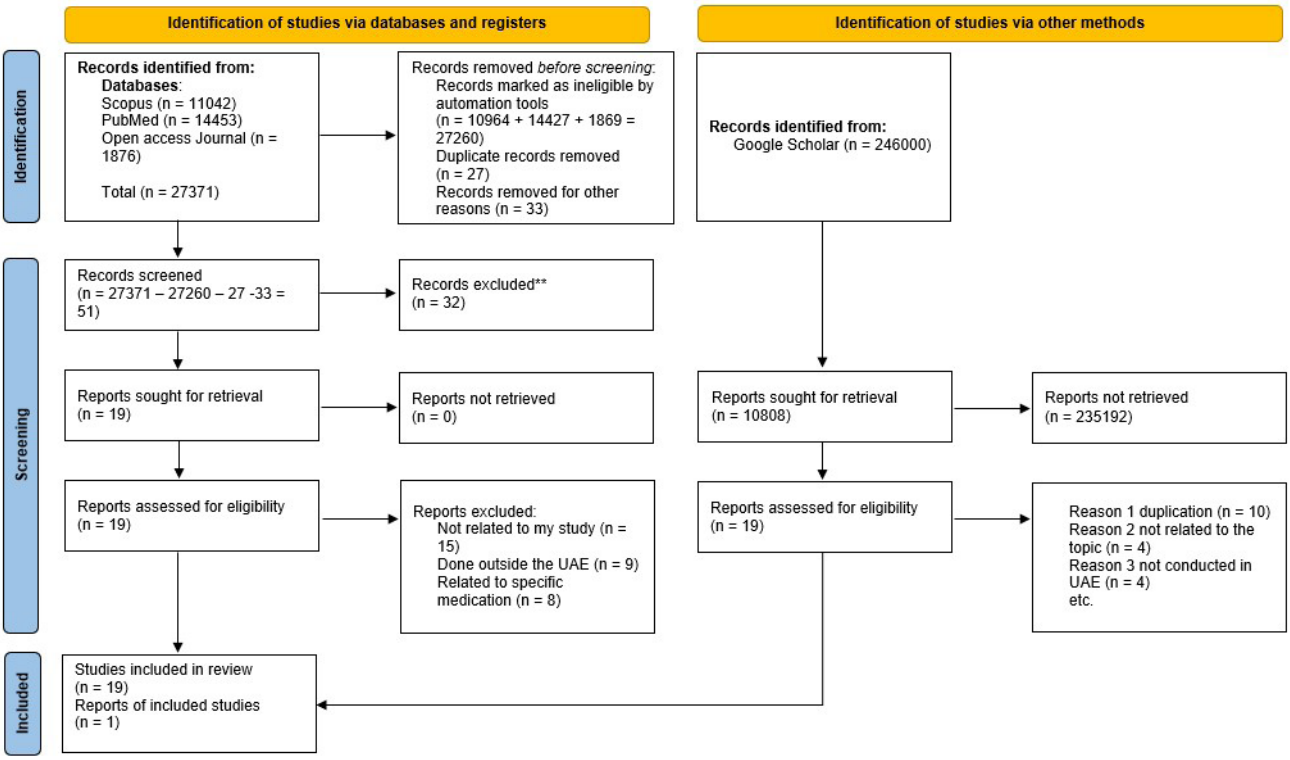

Figure 1 : PRISMA 2020 flow diagram for systematic reviews (38).

Table I : Characteristics of the included literature on the subject pharmacovigilance (PV) system assessment in UAE

References	Author	Year	Journal	Study design	Study location	Sample size (n)	Focusing group	Questionnaire administration	Outcome
(20)	Fahmy S.	2008	Toxi-Drug Info	Workshop	Abu Dhabi	-	Representors from all concerned regulatory authorities, health care providers managers and medical directors from both private and public health sectors	2 weeks training about: **Phase 1:** identifying the infrastructure and fund needed to establish PV program. **Phase 2:** Orientation of private health care facilities to PV activities and polices, monitoring and evaluation for phase 1. **Phase 3:** Orientation of public health care facilities, establish standard reporting mechanism to Upsala monitoring center.	Establishing PV program, Knowledge about PV for HCPs and Public
(23)	John LJ et al	2012	Journal of Pharmaceutical Sciences	Cross-section observational study	Ajman	110	Nurses	Open and close-ended self-administered questionnaire	Knowledge, attitude and practice towards ADR reporting and factors affecting reporting process

(24)	John LJ et al	2012	Journal of Applied Pharmaceutical Science	Cross-section observational study	Ajman	55	Physicians	Open and close-ended self-administered questionnaire	Knowledge, practice and factors affecting ADR reporting
(25)	Wilbur, K.	2013	Drug safety Journal	Cross-section observational study	Middle Eastern countries	13	Heads of the identified centers responsible for medication safety in Arabic countries: Egypt, Iraq, Jordan, Oman, Saudi Arabia, UAE, Bahrain, Kuwait, Palestine, Qatar, Yemen, Lebanon, Syria	The survey questions were adapted from the 2008 "Uppsala Monitoring Centre (UMC) Assessment of Country Pharmacovigilance Situation Questionnaire".	PV situation in the Middle Eastern Countries including domains pertaining to general program information; overview of technology and personnel support; suspected ADR reporting and subsequent data use; and pharmacovigilance activity and advocacy.
(26)	Hamoudi NM	2013	Asian Journal of Biomedical and Pharmaceutical Sciences	non-randomized sampling strategy	Ajman	201	People from the general public attending GMC hospital pharmacy/ GMCHRC [Gulf Medical College Hospital and Research Center]	Open and close-ended self-administered questionnaire	knowledge towards drug interactions and their awareness towards the management and prevention of drug interactions
(27)	Elnour AA	2014	Enliven: Pharmacovigilance Drug Safety Journal	Literature Review	UAE		Clinical Pharmacists		Evaluates the clinical implications of safety data from pre-clinical/clinical studies, literature and other information sources in an attempt to predict / establish the safety profile of pharmaceuticals and manage the risk to patients
(28)	Qassim S et al	2014	IOSR Journal of Pharmacy	Cross-section observational study	Ajman & Sharjah	300	Community Pharmacists	Open and close-ended interview questionnaire	Knowledge, attitude and practice towards adverse drug reaction activity and the association between knowledge, attitudes and practice among UAE CPs toward ADRs reporting

(29)	Qassim S et al	2014	Int J Pharm Sci Res	Cross-section observational study	Ajman & Sharjah	300	Community Pharmacists	Open and close-ended interview questionnaire	The factors that prevent ADR reporting and the factors that encourage reporting.
(21)	Sathvik BS et al	2014	International Journal of Pharmaceutical Sciences and Research	Prospective cross-sectional study	Ras Al Khaimah	75 physicians 50 community pharmacists	Physicians and Community Pharmacists	Open and close-ended self-administered questionnaire	Knowledge, attitude and belief towards ADR.
(36)	Dameh M	2015	IDSR-JPBS	Literature Review	UAE	Articles that focused on medical (not medication) errors and nursing practice errors were excluded.			Describe the research on the incidence and causes of ADR reporting and ME in the UAE, as well as the expectations that health professionals have of pharmacists in this area
(22)	Said AS et al	2017	Hospital Pharmacy	Cross-section observational study	All 7 Emirates	91 healthcare professionals: ▪ 42: Community pharmacists ▪ 33: Hospital pharmacists ▪ 16: Physicians	Healthcare professionals: Community pharmacist, Hospital pharmacist, Physicians	Open and close-ended self-administered questionnaire	Knowledge, attitude, and practice (KAP) of ADR reporting. Identifying steps to avoid underreporting.
(16)	Hassan R	2017		Book Chapter	UAE				Pharmaceutical Policy in the UAE: the health care system in the UAE, its regulatory structure, and present challenges with prime focus on pharmaceutical policies and medicines regulation in the UAE

(34)	Qato, D.	2018	International Journal of Pharmacy Practice	A descriptive cross-sectional study	Arab and Eastern Mediterranean countries	20 countries	Egypt Morocco Jordan Saudi Arabia Sudan Tunisia Iraq Afghanistan Oman Pakistan Iran Algeria Qatar UAE Kuwait Yemen Palestine Comoros Libya Lebanon	WHO pharmacovigilance Indicators and IPAT tool indicators	The country's pharmacovigilance performance.
(37)	Thomas D et al	2018		Book Chapter	UAE				Knowledge, attitude, and practice of pharmacovigilance in developing countries.
(31)	Alnajjar MS et al	2019	Journal of Pharmaceutical Health Services Research	Cross-section observational study	All 7 emirates	230	Pharmacists and technicians working in community pharmacies	Open and close-ended self-administered questionnaire	The main barriers to ADR reporting in community pharmacies and the correlation between ADE reporting and pharmacist's perception and knowledge about ADEs
(33)	Al Omar et al	2019	F1000Research	Literature Review	UAE				Pharmacovigilance in perspective: drug withdrawals, data mining and policy implications
(32)	Alshammari et al	2019	Drug safety Journal	Literature Review	Arab countries	22 Arab countries	Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, UAE, Somalia, Sudan, Syria, Tunisia, Yemen		General overview of the pharmacovigilance system in all Arab countries

(12)	Alshimmari et al	2020	Pharmacoepidemiology and drug safety Journal	Cross-section observational study	Arab countries	22 Arab countries	Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, UAE, Somalia, Sudan, Syria, Tunisia, Yemen	WHO pharmacovigilance Indicators questionnaire	Investigate and provide an overview on the current situation and activities of the national PV centers in Arab countries
(13)	Alkhalidi DK	2020	Pharmacy	Qualitative study	Dubai	14	People from the general public	A semi-structured interview guide	Public views, attitudes, and experiences regarding medication safety and ADR reporting procedures.
(30)	AlWorafi et al	2021	Research Journal of Pharmacy and Technology	Cross-section observational study	Ajman, Sharjah and Dubai	185	Community and hospitals pharmacists	Open and close-ended self-administered questionnaire	Knowledge, attitude, practice and experience towards pharmacovigilance in UAE.

drugs and ADRs to new drugs should be reported and thus contributing to post-marketing surveillance (24). The same study found that only 45.2% of the clinicians were aware that pharmacovigilance center existed (24). It is a well-known truth that ADR raises hospital expenses and places a financial strain on the patient. Other study conducted among community pharmacists revealed that 95.1% of the respondents had poor knowledge score (28). In the Emirate of Ras Al Khaimah, only 28% of the pharmacists and 13.3% of doctors were aware of the ADR reporting system in the UAE (21). Eight-one percent, 83%, and 83.3% and of medical doctors, community pharmacists, and hospital pharmacists, respectively, were not aware of the existence of a reporting center in UAE and 56%, 60%, and 72% were not aware of a reporting procedure (22). A study of community and hospital pharmacists in Ajman, Sharjah, and Dubai in 2021 revealed that 88% of them had a solid understanding of pharmacovigilance and ADR reporting, but that 85.9% were unaware that the UAE had a pharmacovigilance center and that the form for reporting ADRs is available (30). In a study of the general population in the Emirate of Ajman, participants scored well on their knowledge of the different types of drug interactions (drug-drug interaction, drug-food interaction, drug-alcohol interaction, drug-disease interaction), but poorly on their understanding of the potential interactions between over-the-counter (OTC) and prescription medications and herbal remedies and supplements (26). According to the results of a study conducted among the public in Dubai, most people have adequate knowledge of and positive attitudes toward the safe use of medications; however, they are not aware of the following: precise definitions of some related terms, such as drug effectiveness and side effects, the concept of drug interactions, and the doctors' prescribing patterns for drugs like antibiotics and antihistamines. Additionally, they have expressed a lack of satisfaction with the information given by healthcare professionals on medication safety (13). In 2015, a comprehensive review of published literature was conducted by Dameh M and the results showed that community pharmacists in the UAE need to improve their pharmacy practice knowledge in pharmacovigilance and patient counseling skills in order to successfully contribute towards patient safety (36).

Pharmacovigilance Attitude

Attitude towards pharmacovigilance and ADR reporting was measured using multiple choice questions and using Likert scale points. Attitude questions focused on the healthcare providers' viewpoint regarding different aspects of ADR reporting. John LJ et al.(2012) found that 28% of the study's nurses had positive attitudes about reporting ADRs that were over 50% of the score (23). In a study conducted in a tertiary care hospital in Ajman, only 31% of the physicians who took part believed that reporting ADRs was a professional obligation; 57% believed that reporting ADRs should be made

mandatory in the hospital, while 31% thought it should be a voluntary process (24). Community pharmacists included in a study conducted in Ajman and Sharjah showed that 93% of participants had positive attitude towards ADR reporting (28). Similar result found by Al Worafi et al in 2021, where 82.7% of pharmacists working in community and hospital had positive attitude towards ADRs reporting (30). Physicians(78.3 %) and community pharmacists (81.3%) in RAK collectively held the opinion that all drugs were unsafe and required reporting (21). In a study by Said AS et al.(2017), the differences in attitude of medical doctors, community pharmacists, and hospital pharmacists toward reporting ADRs was not significant (22).

Knowledge and attitude about ADR reporting are positively correlated is one of the key findings across all researches. Therefore, if healthcare providers' attitudes are improved along with their knowledge of ADR reporting, this will have a good impact on ADR reporting schemes.

Pharmacovigilance Practice

The questionnaire's practice-related questions asked respondents whether they had ever reported an adverse drug reaction and how frequently. A total of 82.4% nurses had observed ADRs while providing care, and they had all informed the clinicians who needed to know and only 8.8% of the nurses had reported ADRs to pharmacovigilance center (23). In another study, only 6 doctors out of the 19, were aware that a pharmacovigilance center existed and reported to the center (24). Among community pharmacists in Ajman and Sharjah, 88.8% of them had low practice scores, according to Qassim S et al (28). Only 3.6% of participants reported suspected adverse drug reactions to the Ministry of Health (MOHAP) or manufacturers (28). In the Emirate of RAK, only 18.7% of community pharmacists and 21.3% of doctors said that they had reported ADR to various setups (21). Poor ADR reporting practices were shown by responders; only 19%, 14%, and 12.1% of medical doctors, community pharmacists, and hospital pharmacists reported ADRs (22). Among community pharmacists, 48.2% of those who surveyed reported ADRs in the previous year (31). Another study's results revealed that 44.3% of pharmacists had at least encountered one ADR during their practice (30).

Barriers to ADR reporting

The factors that hinder reporting among the healthcare providers were mentioned in some studies. One of these boundaries, according to nurses, is not knowing how to report ADRs (45%) and not knowing which ADRs need to be reported at all (49.5%) (23). These observations reflect the common anxieties among the reporters. One survey also revealed that 71% of doctors said they were unsure how to complete the reporting process (24). Similar results were also found in another study conducted among community pharmacists, where 69% of participants don't know how to report, 81.8% mentioned that form of reporting is not available and 70% believed that all serious ADRs are detected before registration (28). Sathvik BS et al found that most pharmacists (46%) and doctors (48%) stated that they didn't know to whom to report an adverse drug reaction (ADR), and (34%) pharmacists and (28%) doctors stated that since ADRs are frequently observed and well documented in the literature, they didn't feel the need to report them (21). Only 30.4% of community pharmacists in a 2019 study revealed that they did not know how to report, indicating an improvement in pharmacists' level of knowledge regarding the reporting process and 75.7% know that the form of ADRs reporting is easy to be accessible (31). While a research of pharmacists working in hospitals and the community in 2021 revealed that 65.4% of participants did not report because they were not aware that the ADRs reporting form was available and 44.9% don't know where to send these reports (30).

Factors encouraging reporting of ADR

Different strategic approaches suggested by the respondents in different studies to enhance ADRs reporting. Nurses and doctors recommended holding regular training sessions and workshops on ADR reporting, as well as making the ADR reporting form widely available (23) (24). Around 86.8% of these nurses expressed a willingness to receive training (23). Similar results were also concluded by 86% of the pharmacists and 74.7% of physicians participated in a study conducted in Ras Al Khaimah (21). The majority of community pharmacists in Ajman and Sharjah (82.1%) agreed that getting patients to tell their pharmacist about adverse drug reactions is a crucial step in getting those reports in and 75.8% suggested including pharmacovigilance as a topic in the pharmacy curriculum (28). Said AS et al found that increasing reporting system awareness and easier report submission were suggested by 73.6% and 64.8% of respondents, respectively (22). Almost many pharmacists (92.4%) working in community and hospital settings agreed that PV practice can be improved by taking training and seminars about the reporting procedure (30). Thomas D et al mentioned in his book that by continuous education, knowledge can be easier to change than attitude and practice (37). In 2015, Dameh M conducted a thorough review of the literature and discovered that the following factors could encourage pharmacists to practice PV: continuous medical education regarding the monitoring and reporting of ADRs, dissemination of ADR bulletins and feedback reports; use of information technology to make the National PV system and HAAD ADR reporting process easier to access online; and sending of SMS and e-mail reminders to facilitate reporting activities (36). Improving PV system to meet international standards can be achieved by: increasing the budgetary allocation for PV implementation,

addressing policy gaps and implementing educational interventions (34).

Common class of medication(s) causing ADR:
The most prevalent class of drugs producing ADR was viewed differently by healthcare practitioners. According to pharmacists and doctors, respectively, anti-diabetics and antibiotics were among the most popular classes of drugs producing ADR (21).

Person to report ADRs:
Regarding the most qualified person to report an ADR, the majority of responders (87.9%) clearly viewed pharmacists as the most qualified professional group to report an ADR (22). Similar result was also reported by Al Shimari where the American Society of Health-System Pharmacists' standards state that it is the responsibility of pharmacists to report ADRs they experience, to encourage reporting, and to inform other HCPs about this issue (35). This is in contrast to the findings of another survey conducted among community pharmacists across the country, in which more than half of participants (61.4%) said that reporting of ADRs is not part of pharmacists' duties (31). A study conducted in the middle East reported that all healthcare providers (physicians, pharmacists and nurses), as well as individual patients can do the reporting (25). Clinical pharmacists can be very helpful when creating pharmacovigilance committees at healthcare facilities, performing pharmacovigilance safety strategies, and employing electronic systems (27) (36).

CONCLUSION

This review urges more research to evaluate the variations and underlying causes of the under-reporting of ADRs by HPs in the UAE, considering the small number of papers published and variances in study settings and research methodologies. Few studies were published in this area during our evaluation, indicating that pharmacovigilance research is a relatively new area of study in the UAE. PV authorities are encouraged to invest more money in research into pharmacists' practices and roles in patient safety in the UAE, in addition to educating the public and raising awareness. Only two studies included hospital pharmacists in their samples with other healthcare providers, for that a separate study concentrated on hospital pharmacists only is needed. Furthermore, it is essential to create a uniform PV education module to properly equip healthcare professionals to report ADR of medicines.

REFERENCES

1. Pharmacovigilance [Internet]. [cited 2023 Jan 5]. Available from: https://www.who.int/teams/regulation-prequalification/regulation-and-safety/pharmacovigilance
2. Kumar A. Pharmacovigilance: Importance, concepts, and processes. American Journal of Health-System Pharmacy [Internet]. 2017 Apr 15 [cited 2023 Jan 5];74(8):606–12. Available from: https://doi.org/10.2146/ajhp151031
3. Meyer JC, Schellack N, Stokes J, Lancaster R, Zeeman H, Defty D, et al. Ongoing Initiatives to Improve the Quality and Efficiency of Medicine Use within the Public Healthcare System in South Africa; A Preliminary Study. Frontiers in Pharmacology [Internet]. 2017 [cited 2023 Jan 5];8. Available from: https://www.frontiersin.org/articles/10.3389/fphar.2017.00751
4. Bihan K, Lebrun-Vignes B, Funck-Brentano C, Salem JE. Uses of pharmacovigilance databases: An overview. Therapies [Internet]. 2020 Nov [cited 2023 Jan 5];75(6):591–8. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0040595720300470
5. 2015B2.SampleChapter.pdf [Internet]. [cited 2023 Jan 5]. Available from: https://www.accp.com/docs/bookstore/psap/2015B2.SampleChapter.pdf?fbclid=IwAR0y2CBAJV-RqmiaTN7vYAQxsIIsdCIBh16ZejTJfghAui2JfJ3U4T9zZcg
6. Angamo M, Chalmers (nee Stafford) L, Curtain C, Bereznicki L. Adverse-Drug-Reaction-Related Hospitalisations in Developed and Developing Countries: A Review of Prevalence and Contributing Factors. Drug Safety. 2016 Jul 23;39.
7. Suke SG, Kosta P, Negi H. Role of Pharmacovigilance in India: An overview. Online J Public Health Inform [Internet]. 2015 Jul 1 [cited 2023 Jan 5];7(2):e223. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4576445/
8. Härmark L, van Grootheest AC. Pharmacovigilance: methods, recent developments and future perspectives. Eur J Clin Pharmacol [Internet]. 2008 Aug 1 [cited 2023 Jan 5];64(8):743–52. Available from: https://doi.org/10.1007/s00228-008-0475-9
9. Hazell L, Shakir SAW. Under-Reporting of Adverse Drug Reactions. Drug-Safety [Internet]. 2006 May 1 [cited 2023 Jan 5];29(5):385–96. Available from: https://doi.org/10.2165/00002018-200629050-00003
10. Jeetu G, Anusha G. Pharmacovigilance: A Worldwide Master Key for Drug Safety Monitoring. J Young Pharm [Internet]. 2010 [cited 2023 Jan 5];2(3):315–20. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2964775/
11. World Health Organization. WHO pharmacovigilance indicators: a practical manual for the assessment of pharmacovigilance systems [Internet]. Geneva: World Health Organization; 2015 [cited 2023 Jan 5]. 73 p. Available from: https://apps.who.int/iris/handle/10665/186642
12. Alshammari TM. Pharmacovigilance in the Arab World. In: Laher I, editor. Handbook of Healthcare in the Arab World [Internet]. Cham: Springer International Publishing; 2021 [cited 2023 Jan

5]. p. 1929–58. Available from: https://doi.org/10.1007/978-3-030-36811-1_185
13. Alkhalidi D, Jamshed SQ, Elkalmi RM, Baig MR, Aslam A, Hassali MA. General Public Views, Attitudes, and Experiences toward Drug Safety in Dubai, United Arab Emirates: A Qualitative Approach. Pharmacy [Internet]. 2019 Mar [cited 2023 Jan 5];7(1):19. Available from: https://www.mdpi.com/2226-4787/7/1/19
14. UAE-TG.pdf [Internet]. [cited 2023 Jan 5]. Available from: https://www.barbour-ehs.com/wp-content/uploads/2019/12/UAE-TG.pdf
15. MBRSG_PPF_The_State_of_UAE_Healthcare.pdf [Internet]. [cited 2023 Jan 5]. Available from: https://www.uaepublicpolicyforum.ae/wp-content/uploads/2019/01/MBRSG_PPF_The_State_of_UAE_Healthcare.pdf
16. Hassan R, Sher HA, Khokhar R, Hussain R. Pharmaceutical Policy in the UAE. In: Babar ZUD, editor. Pharmaceutical Policy in Countries with Developing Healthcare Systems [Internet]. Cham: Springer International Publishing; 2017 [cited 2023 Jan 5]. p. 365–79. Available from: https://doi.org/10.1007/978-3-319-51673-8_18
17. Moher D, Liberati A, Tetzlaff J, Altman DG, Group TP. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLOS Medicine [Internet]. 2009 Jul 21 [cited 2023 Jan 6];6(7):e1000097. Available from: https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1000097
18. Dinet J, Favart M, Passerault JM. Searching for information in an online public access catalogue (OPAC): the impacts of information search expertise on the use of Boolean operators. Journal of Computer Assisted Learning [Internet]. 2004 [cited 2023 Jan 6];20(5):338–46. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2729.2004.00093.x
19. Kwon Y, Lemieux M, McTavish J, Wathen N. Identifying and removing duplicate records from systematic review searches. J Med Libr Assoc [Internet]. 2015 Oct [cited 2023 Jan 6];103(4):184–8. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4613377/
20. document.pdf [Internet]. [cited 2023 Jan 7]. Available from: https://citeseerx.ist.psu.edu/
21. sridhar sathvik, Chukir D, Kadir E, Nady M. Knowledge, attitude and Belief of Hospital Physicians and community pharmacists towards adverse drug reaction reporting in Ras Al Khaimah. (Awarded third place-oral presentation). 2012.
22. Said ASA, Hussain N. Adverse Drug Reaction Reporting Practices Among United Arab Emirates Pharmacists and Prescribers. Hosp Pharm [Internet]. 2017 May 1 [cited 2023 Jan 7];52(5):361–6. Available from: https://doi.org/10.1177/0018578717715364
23. John LJ, Arifulla M, Cheriathu JJ, Sreedharan J. Reporting of adverse drug reactions: an exploratory study among nurses in a teaching hospital, Ajman, United Arab Emirates. DARU J Pharm Sci [Internet]. 2012 Dec [cited 2023 Jan 7];20(1):44. Available from: http://link.springer.com/10.1186/2008-2231-20-44
24. John. Reporting of Adverse Drug Reactions: a study among Clinicians. J App Pharm Sci [Internet]. 2012 Jun 28 [cited 2023 Jan 7]; Available from: http://www.japsonline.com/abstract.php?article_id=518
25. Wilbur K. Pharmacovigilance in the Middle East. Drug Saf [Internet]. 2013 Jan 1 [cited 2023 Jan 7];36(1):25–30. Available from: https://doi.org/10.1007/s40264-012-0001-y
26. Hamoudi N, Al Obaidi N, Khan F. Drug Interaction Awareness among Public Attending GMCH Ajman UAE. 2013 Jun 10;
27. Ahmed Elnour A, Shehab A, Sirknath A, MS Al Kalbani N, Ataia A, Asim S. The Proactive Pharmacovigilance Clinical Pharmacist: Is it Specialty of its Own. Enliven: Pharmacovigil Drug Saf [Internet]. 2014 [cited 2023 Jan 7];01(04). Available from: http://enlivenarchive.org/2378-5411-1-4-e004.html
28. Qassim S, Metwaly Z, Shamsain M, Hariri YA. Reporting Adverse Drug Reactions: Evaluation of Knowledge, Attitude and Practice among Community Pharmacists in UAE.
29. Alebrahem S, Zakiametwaly, Shamsain M, Alhariri Y. Spontaneous Reporting of Adverse Drug Reactions in UAE: Obstacles and Motivation Among Community Pharmacists. International Journal of Pharmaceutical Sciences and Research. 2014 Jan 1;5:4203–8.
30. AlWorafi YM, Hasan S, Hassan NM, Gaili AA. Knowledge, attitude and experience of pharmacist in the UAE towards pharmacovigilance. Research Journal of Pharmacy and Technology (RJPT) [Internet]. 2021 [cited 2023 Feb 22];14(1):265–9. Available from: http://www.indianjournals.com/ijor.
31. Alnajjar MS, Zamzoum LM, Saeed DA. Barriers to adverse drug reaction reporting in community practice in the UAE. Journal of Pharmaceutical Health Services Research [Internet]. 2019 [cited 2023 Jan 7];10(3):373–80. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/jphs.12314
32. Alshammari TM, Mendi N, Alenzi KA, Alsowaida Y. Pharmacovigilance Systems in Arab Countries: Overview of 22 Arab Countries. Drug Saf [Internet]. 2019 Jul [cited 2023 Jan 7];42(7):849–68. Available from: http://link.springer.com/10.1007/s40264-019-00807-4
33. Alomar M, Palaian S, Al-tabakha MM. Pharmacovigilance in perspective: drug withdrawals, data mining and policy implications [Internet]. F1000Research; 2019 [cited 2023 Jan 7]. Available from: https://f1000research.com/

articles/8-2109
34. Qato DM. Current state of pharmacovigilance in the Arab and Eastern Mediterranean region: results of a 2015 survey. International Journal of Pharmacy Practice [Internet]. 2018 May 4 [cited 2023 Jan 7];26(3):210–21. Available from: https://academic.oup.com/ijpp/article/26/3/210/6099594
35. Alshammari TM, Alenzi KA, Ata SI. National pharmacovigilance programs in Arab countries: A quantitative assessment study. Pharmacoepidemiology and Drug Safety [Internet]. 2020 [cited 2023 Jan 7];29(9):1001–10. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1002/pds.4991
36. Dameh M. United Arab Emirates Pharmacists' Practices and Views on Adverse Drug Reaction and Medication Error Reporting and Health Professionals' Expectations.
37. Thomas D, Zachariah S. Chapter 11 - Knowledge, Attitude, and Practice of Pharmacovigilance in Developing Countries. In: Ibrahim MIM, Wertheimer AI, Babar ZUD, editors. Social and Administrative Aspects of Pharmacy in Low- and Middle-Income Countries [Internet]. Academic Press; 2018 [cited 2023 Jan 7]. p. 177–93. Available from: https://www.sciencedirect.com/science/article/pii/B978012811228100011X
38. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ [Internet]. 2021 Mar 29 [cited 2023 Mar 20];372:n71. Available from: https://www.bmj.com/content/372/bmj.n71