Evidence Based Health Policy, Management & Economics

ORIGINAL ARTICLE

Management of Medication Error Reporting in HIV/AIDS Patients

Narges Keshtkar [1], Iravan Masoudi Asl [2*], Somayeh Hessam [1], Soad Mahfoozpour [1]

[1] Department of Health Services Management, Faculty of Management, Islamic Azad University, South Tehran Branch, Tehran, Iran
[2] Department of Health Services Management, School of Management and Medical Information, Iran University of Medical Sciences, Tehran, Iran

A B S T R A C T

Background: One of the most frequent medical mistakes that lower patient safety and mortality is medication errors in HIV/AIDS patients. A structured reporting system is necessary for the efficient avoidance of these kinds of mistakes. In order to discover parameters influencing the management of medication mistake reporting in HIV-infected patients, the current research was carried out.

Methods: The current research is an example of an applied study that was carried out between 2010 and 2019 utilizing a hybrid (quantitative-qualitative) methodology. First, the primary factors impacting the management of medication mistake reporting in HIV positive patients were collected from a study of the research literature and 35 interviews with experts in the area of treating HIV patients, and a research questionnaire was created utilizing them. Using the Lawshe approach, the questionnaire was sent to and collected from 31 experts in order to assess its content validity. $SPSS_{23}$ was then used to determine the questionnaire's reliability, which resulted in a Cronbach's alpha value of 0.920. 400 workers who treated HIV/AIDS patients provided information for the data collection. Exploratory factor analysis was used to analyze the data, together with $SPSS_{23}$ and Lisrel software.

Results: Four factors were found to be important in managing medication mistake reporting in HIV patients, including organizational factors (18 variables), person factors (9 variables), educational factors (10 variables), and communication factors (6 variables). The management of medication mistake reporting in HIV patients was impacted most and least by personal and educational variables, with factor loadings of 0.784 and 0.754, respectively.

Conclusion: It is preferable to concentrate on individual variables (employee-related hurdles, fear of the repercussions of reporting, and others' reactions) rather than addressing all four aspects at once in order to manage medication mistake reporting in HIV positive patients (managers, colleagues, patients). Managers, policymakers, specialists from behavioral disease counseling centers, and attending physicians should pay greater attention to both the individual (application and development of the integrated HIV management system).

Key words: Error reporting, Medication error, HIV/AIDS, Patient safety, Exploratory factor analysis

Introduction

In order to reduce the likelihood of medication and medical mistakes in healthcare settings, patient safety is recognized as one of the key elements of high-quality treatment (1, 2). Despite the presence of knowledgeable employees, medical mistakes are unavoidable in the complicated context in which health care is given, endangering patient safety (3). Safe patient care reduces negative outcomes including lengthier hospital stays, a greater mortality risk, and expensive medical treatment (2, 4, 5).

One of the fundamental tenets of providing

Corresponding Author: Iravan Masoudi Asl
Email: drmasoudiasl@gmail.com
Tel: +98 912 506 0486
Department of Health Services Management, School of Management and Medical Information, Iran University of Medical Sciences, Tehran, Iran

medicine to a patient is to help him recover his health while causing no damage (6). The most significant problems that endanger patient safety are pharmacological side effects and medical mistakes, and practically all healthcare systems do not have ideal circumstances in this area (7). The frequency of medication mistakes is reportedly greater in poor nations than in industrialized ones (8), according to the World Health Organization, which has estimated that millions of people are exposed to damage from pharmaceutical errors, many of which are avoidable (9).

Any avoidable incident that may result from the wrong administration of medicine and has the potential to endanger the patient is referred to as a medication error (10, 11). Medication mistakes result in major problems such long-term hospitalization, poor patient outcomes, and loss of quality of life (12–14), which are expensive for patients and their families, hospitals and their medical personnel, and insurance companies.

Error reporting helps determine system errors and vulnerabilities, which in turn enhances patient safety; But unfortunately, the study indicates that in terms of lack of suitable feedback, insufficient response of managers, and organizations to offenders, managers' concentration on offenders without regarding other related factors, lack of support from managers, the presence of a culture of punishment and blame, fear of laws and disciplinary measures, loss occupation, and lack of clear definition of errors, the error reporting rate is much lower than the actual rate (15-20).

Undoubtedly, the underreporting of medication mistakes impedes the identification and prevention of medication error causes and reduces the potential to enhance patient safety by learning and sharing information about error detection and safe procedures (21, 22). Therefore, reporting medication mistakes is vital to preventing medication errors, which is a crucial step in promoting safe practices, including pharmaceutical safety (23). Error reporting should be seen as an opportunity to enhance patient safety by learning from mishaps (24). The World Health

Organization vowed in 2017 to minimize pharmaceutical mistakes by 50 % by 2022. Medication mistakes must be reported when they occur in order to limit their occurrence and prevent them from happening again (25). Fear of retaliation, impractical or costly reporting systems, and the absence of feedback on reported mistakes all contribute to the underreporting of prescription errors (26-28). A research in South Korea found that 50.800 % of pharmaceutical mistakes were reported electronically in hospitals (29), while another study found that 63.600 % of medication errors occurred in acute care hospitals (30). It is estimated that nursing errors cause 251,000 deaths per year in the United States, and medical errors are the third leading cause of death, although only 10 percent of errors are reported (31). In the Eastern Mediterranean region, the incidence of injury from medication errors fluctuates between 2 and 18 percent. In Iran, there are no accurate data on pharmaceutical mistakes (32).

According to the UNAIDS estimate in Iran, 54,000 individuals will be infected with HIV by 2020, 2,400 persons will get the HIV/AIDS virus for the first time in 2020, and 15,000 patients (29 percent) will be receiving antiretroviral therapy (33). Consequently, this group is susceptible to drug mistakes. Despite the importance of medication error reporting in enhancing patient safety, no worldwide evaluation of the evidence linked to ME reporting in hospitals has been done to date (34).

There are no statistics on the reporting of medication mistakes in HIV/AIDS patients, nor have any studies been conducted on the reporting of medication errors in persons infected with the virus worldwide or in Iran. Consequently, this study is innovative in this field; however, the results of studies conducted in other nations indicate that the organizational structure must address several challenges, such as deficiencies in communication and educational factors with the patient, the absence of a platform for reforms in hospitals and treatment centers, and deficiencies in organizational factors. Modifying the structure and management method of these medication errors is

the primary solution to increase patient safety and improve their conditions. As a result of the fact that the use of drugs in hospitals for pregnant mothers, children, or other patients with the virus, welfare centers, and care centers for the elderly is not supervised by experts from disease counseling centers, a large number of errors occur that are frequently not reported and are frequently discovered only after they have occurred. Returning to counseling centers for behavioral diseases, we will observe the occurrence of errors in other centers, and as a result, the immune system of the patients will be exposed to a serious risk, which will have a direct impact on the viral load of the patients, or the possibility of occupational exposure for health sector employees will be created, and the possibility of follow-up will be created. Due to the fear of the type and source of exposure, this should not be done. Furthermore, considering the direct effect of retroviral drugs on improving the safety of patients and the significance of the issue in Iran's health system, and since it is based on surveys, there is no comprehensive study related to the factors affecting the effectiveness of the issue. The management of medication error reporting in HIV patients in Iran and around the world has not been studied, nor has a suitable model for the management of medication error reporting in HIV/AIDS patients been developed; therefore, the purpose of the current study is to identify and explain the role and significance of factors affecting management. The design and implementation of a drug mistake reporting system for HIV patients in Iran's health system have been completed.

Materials and Methods

The present study is a kind of applied research that was done utilizing a quantitative-qualitative approach. Through the analysis of research literature and relevant papers and books (4 domestic studies and over 40 international studies) as well as interviews with 35 experts in the area of medication error reporting management in HIV/AIDS patients, 76 components and beneficial

factors were identified. The interviewees included infectious disease specialists, nurses, experts, doctors, and faculty members from Khuzestan and Arvand International Universities of Medical Sciences, Tehran University of Medical Sciences, Iran, Shahid Beheshti, and the Ministry of Health, Treatment, and Medical Education to discuss the reporting of medication errors in HIV-positive patients. Entry into the sample required at least 5 years of expertise in the area of HIV/AIDS therapy and more than 10 years of experience in management. The perspectives of experts were gathered utilizing the expert round table technique. Next, 76 variables were made available to HIV/AIDS committee employees working in behavioral disease counseling centers around the nation, infectious disease departments of hospitals, professors and faculty at universities, and HIV/AIDS disease focal sites and the Ministry of Health (35 people). And the comments' feedback was sent to them again. The original conceptual model was established when the prerequisites for consensus were met (the agreement of more than 75 % of the experts about each item was the foundation for consensus). The received data were then compiled and categorized on an information form. The parameters impacting the management of medication error reporting in HIV/AIDS patients were found and retrieved using exploratory factor analysis. The consensus of experts was held in the presence of the same 35 experts who participated in the interview in order to confirm the main components and factors. The final questionnaire framework consisted of 43 variables with four factors, including organizational factors, individual factors, educational factors, and communication factors. The questionnaire was constructed using a five-point Likert scale (from very low = 1 to extremely high = 5). To assess the content validity of the questionnaire, Lawshe approach was used to the views of the same experts in the test's topic area. The questionnaire was disseminated and collected from 31 specialists who were also present at the end stage of the research in order to assess its reliability. Using $SPSS_{23}$, the Cronbach's alpha

coefficient was determined, which was 0.920, showing the questionnaire's high reliability. The questionnaire's reliability coefficient is shown in Table 1.

About 200 samples are needed for confirmatory factor analysis and the use of Lisrel software for the ten recommended areas (35, 36). To be sure, 470 people (faculty members, doctors treating HIV/AIDS disease, nurses, pharmaceutical experts of centers advising on behavioral diseases, and well-being experts across the country) were given the questionnaire; Finally, 400 questionnaires (or 85.100 % of the 470 distributed surveys) were gathered and examined. The appropriateness of the sample size for factor analysis was assessed using the Kaiser-Meyer-Olkin (KMO) sampling adequacy index. The quantity of KMO varies between zero and one, and results around one for this test indicate that the data's factor analysis was effective (37). This indicator was used in the current research to assess the sample size's suitability, and the result was 0.963. The significance threshold was set at 0.050, and descriptive statistics (number, frequency, and percentage) and structural equation modeling were used to evaluate the data gathered. The goal of the study was stated to the research subjects and their anonymity was guaranteed in order to adhere to ethical standards. Additionally, it was promised that they would have access to the study's findings if necessary.

Further, in the current study all ethical issues were observed based on the Helsinki Declaration. This study was registered with the code of ethics (IR.IAU.SRB.REC.1399.209).

Table 1. Reliability coefficient of medication error reporting management questionnaire in HIV/AIDS patients

Cronbach's alpha	Variable
0.84	Organizational factors (18 items)
0.93	Individual factors (9 items)
0.91	Educational factors (10 items)
0.79	communication factors (6 items)
0.92	The whole questionnaire

Results

The results of this study revealed that among the 400 persons who responded to the questionnaires, males (66 %), people between the ages of 31 and 40 (48 %) and those with professional doctorates (59 %) and studies in the area of medicine (40 %) had the greatest frequency. Of them, the behavioral illness counseling center employed (70.250 %) of them. Table 2 displays the demographic characteristics of the research participants in frequency distribution.

The most useful variables for the management of medication mistake reporting in HIV/AIDS patients were retrieved based on the present research's sources and utilizing exploratory factor analysis. The results of exploratory factor analysis using the varimax rotation method demonstrated that the four factors, organizational factors, individual factors, educational factors, and communication factors, identified by experts have an eigenvalue greater than one, which remained in the analysis and are the factors that effectively manage error reporting. They created a medication for those with HIV/AIDS. The management of medication error reporting in HIV/AIDS patients was managed by removing duplicate data and components and organizing them into four categories of primary elements (organizational factors, individual factors, educational factors, and communication factors). The elements that stay in the analysis are determined by the eigenvalue. A factor was not included in the study if its eigenvalue was less than one. The components that do not contribute more to the variance's explanation are those that are left out of the analysis. Organizational factors made up the first element's eigenvalue, which was equal to 12.569, and communication factors made up the fourth factor, which was equal to 5.881. Additionally, a total of 69.004 percent of the variability of the variation of the variables could be explained by these 4 extracted components. The particular values of the variables influencing the management of medication mistake reporting in HIV/AIDS patients, together with the proportion of variation explained by each variable, are shown in

table number three.

Then, to approve the factors provided from exploratory factor analysis, confirmatory factor analysis was done applying Lisrel software and the relations of variables were extracted utilizing structural equation method. Findings from calculating Chi-square/df fit indices with a value of 11256.745, Comparative Fit Index (CFI) with a value of 0.961, (NFI) Normed Fit Index with a value of 0.924, (PCFI) Parsimonious Comparative Fit Index with a value 0.636 and (RMSEA) Root Mean Square Error of Approximation with a value of 0.036 were all within the optimal range.

The results also demonstrated that all factors' factor loadings and component loadings are verified to be more than or equal to 0.700. The primary elements comprised interpersonal factors, which had nine components, educational factors, which had ten components, and communication factors, which had six components. Organizational factors had eighteen components. In terms of their overall effect on the model, these dimensions were as follows: individual factors (0.784), organizational factors (0.782). educational variables (0.773) and communication factors (0.754). With factor loadings of 0.784 and 0.754, respectively, individual and educational variables had the greatest and lowest standard coefficients among factors. In table number four, the factor loadings of variables influencing the management of medication error reporting in HIV/AIDS patients are provided.

Table 2. Frequency distribution of demographic characteristics of study participants

Demographic characteristics		Number	Percentage
Gender	male	264	66
	Female	136	34
Age	21-30 years old	52	13
	31-40 years old	192	48
	41-50 years old	80	20
	Over 50 years old	56	14
	Lost values	20	5
Education	BA	16	4
	MA	96	24
	Professional Doctorate	236	59
	PhD	40	10
	specialist	12	3
Educational field	Management	3	0.75
	Medicine	160	40
	Medical groups field	79	19/75
	Health	130	32/50
	Other fields	28	7
Service location	Behavioral Diseases Counseling Center	281	70/25
	Hospital	63	15/75
	Faculty member	29	7/25
	Ministry of Health and Medical Education	7	1/75
	Rehabilitation	13	3/25
	Other cases	7	1/75
Current position	Faculty	76	19
	Management positions	161	40
	Expert positions	101	25
	Other cases	62	16
Academic rank of faculty members	Assistant professor	47	11/75
	Associate professor	19	4/75
	Professor	10	2/50

Table 3. Specific values of factors influencing the management of medication error reporting in HIV/AIDS patients

Factors	Special Values		
	Special values	Variance percentage	Cumulative percentage
Organizational factors	12/56	12/93	12/93
Personal factors	9/23	9/92	26/30
Educational factors	6/45	6/31	53/13
Communication factors	5/88	4/70	69/004

Table 4. Factor loadings from the exploratory factor analysis of factors influencing the management of medication error reporting in HIV/AIDS patients

Main factor	Factor load of the main factors	Components	Factor load of components
Organizational factors (18 components)	0/78	Application and developing comprehensive HIV management system	0/79
		Planning for obtaining resources and manpower management	0/78
		Scheduling of patient appointments (patient-to-workload ratio)	0/78
		Forming a care quality improvement committee to monitor the work of experts and doctors on a weekly basis	0/78
		Identifying the limits of responsibilities and the limits of authority of employees	0/78
		Managing physical space and medicine and equipment and ensuring environmental safety (crowding and disorder control, physical protection)	0/77
		Feedback from officials on errors in the patients' medication documents	0/77
		Implementing and clarifying the error reporting process	0/77
		Management barriers	0/75
		Systemic barriers	0/75
		Supervision of delivery and prescription of medicine by experts and doctors	0/75
		Monitoring the expiration date of drugs	0/75
		Supervising the way of writing patients' drug reports (complete and legible writing) by doctors	0/75
		The existence of a unit for handling patients' medication documents	0/74
		Monitoring of drugs applied by patients by non-governmental organizations and welfare centers	0/73
		Complexity of care and working environment conditions	0/73
		Applying a multi-layered communication platform and contributing medical and therapeutic information	0/73
		Monitoring drug supply system and process (improper inventory management and inefficient distribution system)	0/73
Educational factors (10 components)	0/75	Education about the significane of error reporting culture	0/81
		Training employees about different trade names of drugs and similarity of names of drugs	0/80
		Training hospital staff and nurses on how to store refrigerated drugs	0/79
		Involvement of managers in training employees about the latest guidelines	0/78
		Training of treating doctors considering the correct writing and correct dosage of medicines	0/78
		Training of treating doctors regarding the principles of correct prescription and the structure of medication orders	0/75

Main factor	Factor load of the main factors	Components	Factor load of components
		Practice and repeat the latest guidelines and instructions	0/73
		Empowerment of human resources (expert working in pharmaceutical unit)	0/72
		Empowering human resources (doctors treating HIV)	0/72
		Training employees about the difference in pharmaceutical forms	0/71
Individual Factors (9 components)	0/78	Obstacles due to the employee and fear of the consequences of reporting, and the reaction of others (manager, colleagues, patient)	0/83
		Management of stress and burnout of employees	0/81
		The presence of a system of punishment and encouragement of employees	0/76
		The presence of payment and compensation system for employees	0/75
		Worried about the effect of mistakes in the evaluation score	0/74
		Indulging in side activities in doctors and experts	0/74
		Identifying the job descriptions of human resources	0/73
		Documenting the activities performed in the pharmaceutical unit	0/69
		Provision of welfare facilities for employees	0/68
Communication factors (6 components)	0/77	The changes in the service delivery system and improvement of communication among treating doctors and experts and patients	0/83
		Enhancing communication processes	0/82
		Facilitating group relations between hospitals and behavioral disease counseling centers	0/82
		Intra-organizational communication with infectious focal point regarding the type of medicine used by patients	0/80
		Efficient information systems and error reporting (monitoring)	0/77
		Treating patients directly (in the presence of experts)	0/76

Discussion

The extent of each of the parameters influencing the management of medication error reporting in HIV/AIDS patients was identified in the current research. According to the results, individual factors (0.784), organizational factors (0.782), communication factors (0.773), and educational factors (0.754) are the main factors affecting the management of medication error reporting in HIV/AIDS patients in Iran's health system. It is important to pay attention to these factors. The most significant element influencing the management of medication error reporting in HIV/AIDS patients is the component of individual factors, with an effect value of 0.784, while the least significant factor is the component of educational factors, with an impact factor of 0.754. The findings of this research were generally in agreement with other investigations.

The current research's findings demonstrated that individual variables are the most significant influences on the management of medication mistake reporting in the patients under investigation (0.784), with the greatest coefficient of impact among those factors in HIV/AIDS patients. An improvement in this area would enhance the management of reporting medication mistakes in virus-infected individuals. The component of barriers connected to the employee and fear of the repercussions of reporting and the response of others (managers, colleagues, patients) make up (0.830).

There was no research that looked particularly at the reporting of medication mistakes in HIV/AIDS patients. Physicians want safe workplaces with ongoing, supportive feedback when mistakes are made, according to Perez et al[38]'s comprehensive investigation on the obstacles to reporting medical errors and revealing errors. Also sought after by doctors are anonymity, secrecy,

and private chat rooms so they may openly share mistakes and provide support to one another. In order to enhance the process of reporting medication mistakes, it is thought that Iran's healthcare system needs such safe spaces. The most frequent reasons given by nurses for choosing not to report were the fear that the error would result in the patient suffering a serious injury, the payment of a ransom, and the worry that the employee would receive a poor evaluation after reporting. It was suggested (39) to foster a good working relationship between managers and nurses and to create a suitable environment during reporting. Personal obstacles including fear, responsibility, and nursing traits, according to Vrbnjak et al(26)'s research prevent people from reporting prescription mistakes. They also underlined in their research, which was in accordance with the current study, the need to foster a culture of safety, learning without judgment, non-punishment, and fear at the level of the unit and organization. Experts at behavioral disorder counseling facilities around the nation will often remain silent when mistakes are made and reported because they believe doing so would ruin their reputation in the eyes of their direct managers, lower their evaluation score, and put them at risk of being disciplined. The patient and his friends will be terrified because they would see him as a person who lacks knowledge and experience. As a result, it is essential and required that patients have a greater understanding of the sort of medication they are taking and are informed about these types of medications by the counseling center's specialist. As a result, management of counseling centers for behavioral diseases should create crucial strategies to lessen stress and depression among their staff members. They should also use an incentive system to increase the motivation of experts in cases of error reporting, as well as provide occupational and legal immunity for staff members of counseling centers. Behavior disorders that openly acknowledge their mistakes will support a patient safety culture by avoiding mistakes from being covered up. Therefore, it is advised to take simple steps to reduce the workers'

hurdles.

Results from the current study indicated that organizational factors are second only to individual factors in influencing the management of medication error reporting in HIV/AIDS patients (0.782), and that among organizational factors, one of the reforms with the highest impact factor and It can lead to the reduction and improvement of the reporting management of medication errors in HIV patients is the application and development of a comprehensive system for identifying, investigating, and addressing such errors (0.796). Electronic solutions have been stressed by Yürür et al(40) in their research to help with medication mistake reporting and prevention, as well as to provide the groundwork for a more robust medication error management system. In order to reduce medication errors, Al-Ahmadi et al(41) (2020) suggested the promotion of a comprehensive management information system and cited individual factors, organization and management, task, work, and group as effective factors on the management of medication errors in hospitals, drug safety, and employee well-being. That all other research line up with this one. To better the status of reporting drug errors in infected patients in the event of occurrence, encourage monitoring and control over all existing processes, review or comply with regulations and guidelines, the error reporting process, and the planning for provision, pharmaceutical affairs should always prioritize patient treatment protocols and guidelines. Organizational elements in counseling centers for behavioral problems may benefit from monitoring these restrictions via proper ways, which can assist with resource allocation and the optimal scheduling of patients. When it comes to providing better service, queueing systems are crucial (42). Making appointments for patients requires creating a standard timetable that will avoid congestion throughout the week by allocating appointments fairly.

The current study's findings revealed that among the communication factors, using components of change and transformation in the service delivery

system and improving communication between doctors, therapists, and experts and patients is one of the reforms that has the highest impact factor and can improve reporting management of drug errors in those infected with the virus (0.833). Affected individuals' living situations may be improved or restored to their pre-illness state by making choices and taking activities in behavioral disease counseling centers to increase effective communication between the patient and care providers. The majority of studies agreed with these conclusions. The work by Clapper et al(43). did not agree with the current study. Kee et al(44)'s research included the significance of patient and service provider communication elements. In this study, the researchers looked at the communication abilities required for patient-doctor interactions utilizing the complaints of actual patients. They found four instances of poor communication (verbal, nonverbal, content, and weak attitudes). Benjamin et al(45)'s research also gave a clear explanation of how improper communication is brought on by inadequate information, inefficient communication techniques, a lack of established protocols for patient and provider contact, and the ignorance of referrers who are unaware of their patients. They cited poor judgment, poor recall, and a failure to employ common communication tools as the causes of these communication failures. It is important to pay attention to these aspects in order to enhance patient-provider communication and patient referral awareness. Vermeir and colleagues also highlighted the dangers of inadequate communication in healthcare, which results in a loss of continuity of treatment and jeopardizes safety, in their research. Patients, ineffective use of precious resources, patient discontent, physician overuse, and often hidden economic effects (46). Clapper et al(43) in their systematic study on the investigation of the issue that the majority of medical and pharmaceutical errors are attributed to communication, came to the conclusion that among medication errors, errors of commission or omission predominated (21.400 %), and communication errors were only common in 7 %

of studies. Therefore, this comprehensive analysis did not support the idea that the majority of medical and pharmaceutical mistakes may be linked to poor communication problems. As a result, this research did not agree with the current study. Behavioral illness counseling centers should retain the essential flexibility in the stage of communication components via human resources, engagement of partner organizations, and timely and proper assessment of the services offered, according to the findings of previous research. In order to improve communication between the parties, reduce mistakes, and better understand how patients engage with their physicians and counselors in behavioral illness counseling centers, it is necessary to do research on these topics.

According to the results of the current study, the component of education regarding the significance of an error reporting culture (0.810) had the highest impact factor among educational factors influencing the management of medication errors in virus-infected individuals, and its modification enhanced the management of error reporting. It is a treatment for persons who have contracted the virus. There was no research that looked particularly at the reporting of medication mistakes in HIV/AIDS patients. Given that there was no correlation between nurses' perceptions of patient safety culture and the reporting of medication errors, Jang et al (47)'s study came to the conclusion that more research into the promotion of patient safety culture and medication mistake reporting should be done. By taking into account several dimensions, they demonstrated the favorable view of patient safety culture in error reporting. Alshammari et al(48)'s research found a serious absence of medication mistake reporting, understanding of the processes for reporting medication errors, and education regarding medication errors. They emphasized the urgent need to teach these elements. Additionally, Unal et al(49) in their research highlighted the need of encouraging a web-based reporting system (so that drug mistakes may be quickly reported) and of course fostering a safety culture among physicians

and other healthcare professionals. The nurses stressed. In order to quickly access the training group, their list with their phone numbers should be posted in the provincial centers and on the official ministry websites. Counseling centers for behavioral diseases should therefore always have access to a group of trained employees to play a role and provide helpful and effective training when necessary. Maintaining and updating medical knowledge is important for health and treatment. A good and creative approach to stop mistakes from being concealed is the availability of clear rules and laws and the need to create a flowchart of the process of reporting errors on how to report, to whom to report, and what items need to be reported. holding weekly training sessions by medical professionals and experts in infectious diseases for the staff of hospitals and behavioral disease counseling centers regarding the medications on the medicine shelf, the necessity of setting up a training room in behavioral disease counseling centers, and creating training groups on social media with the staff of hospitals and welfare centers in order to reminding patients about their trainings and prescriptions is advised. Additionally, the person in charge of counseling centers for behavioral illnesses will determine the necessity for any trainings at the start of each month and create a training program for the hospitals' target staff populations.

The Ministry of Health, Medical Education, Welfare Organizations, and hospitals are just a few of the government organizations that may make use of the findings from the current study in the interest of public health and the care of HIV/AIDS patients in the nation. It is also anticipated that the results of this study will be made available to policy makers and other stakeholders involved in the fight against HIV, who will be able to use them to develop better strategies for enhancing both the safety of patients receiving treatment and the caliber of healthcare services offered to both patients and their peers. The geographical dispersion of the population under study throughout the nation was a research restriction

that was overcome with the assistance of one to two officials and specialists from each province.

Conclusion

According to the findings of the current study, it is preferable to take into account individual factors (obstacles related to the employee and fear of the consequences of reporting and the reaction of those around him (manager, Colleagues, patients)) and organizational factors (application and development of comprehensive HIV management system) while paying attention to all four factors in order to successfully manage medication error reporting in HIV positive patients. Additionally, it is anticipated that the Ministry of Health, Treatment and Medical Education will be able to utilize the findings of this study to enhance patient safety, modify workplace conditions, enhance organizational and human aspects, decrease medication mistakes, and enhance patient happiness.

Acknowledgments

Conflict of interests

The authors declared no conflict of interests.

Authors' contributions

Keshtkar N, Masoudi Asl I, Hessam S and Mahfoozpour S designed research; Keshtkar N and Masoudi Asl I conducted research; Keshtkar N and Mahfoozpour S analyzed data; and Keshtkar

N, Masoudi Asl I, Hessam S and Mahfoozpour S wrote the paper. Keshtkar N and Masoudi Asl I had primary responsibility for final content. All authors read and approved the final manuscript.

References

1. Ross Ch, Rogers C, King Ch. Safety culture and an invisible nursing workload. Collegian. 2019; 26(1): 1-7. doi: 10.1016/j.colegn.2018.02.002.

2. Vaismoradi M, Tella S, Logan PA, Khakurel J, Vizcaya-Moreno F. Nurses' adherence to patient safety principles: A systematic review. International Journal of Environmental Research and Public Health. 2020; 17(6): 2028. doi: 10.3390/ijerph17062028.

3. Hutchinson AM, Sales AE, Brotto V, Bucknall TK. Implementation of an audit with feedback knowledge translation intervention to promote medication error reporting in health care: A protocol. Implementation Science. 2015; 10(1): 1-9. doi: 10.1186/s13012-015-0260-y.

4. Machen S, Jani Y, Turner S, Marshall M, Fulop NJ. The role of organizational and professional cultures in medication safety: A scoping review of the literature. International Journal for Quality in Health Care : Journal of the International Society for Quality in Health Care. 2019; 31(10): G146-G57. doi: 10.1093/intqhc/mzz111.

5. Sturm H, Rieger MA, Martus P, Ueding E, Wagner A, Holderried M, et al. Do perceived working conditions and patient safety culture correlate with objective workload and patient outcomes: A cross-sectional explorative study from a German university hospital. PLoS One. 2019; 14(1): e0209487. doi: 10.1371/journal.pone.0209487.

6. Stump LS. Re-engineering the medication error-reporting process: Removing the blame and improving the system. American Journal of Health-System Pharmacy. 2000; 57(suppl_4): S10-S7. doi: 10.1093/ajhp/57.suppl_4.S10.

7. Bifftu BB, Dachew BA, Tiruneh BT, Beshah DT. Medication administration error reporting and associated factors among nurses working at the University of Gondar referral hospital, Northwest Ethiopia, 2015. BMC Nursing. 2016; 15: 43. doi: 10.1186/s12912-016-0165-3.

8. Farhoudi B, Ghalekhani N, Afsar Kazerooni P, Namdari Tabar H, Tayeri K, Gouya MM, et al. Cascade of care in people living with HIV in Iran in 2019; how far to reach UNAIDS/WHO targets. AIDS Care. 2022; 34(5): 590-6. doi: 10.1080/09540121.2021.1944603 [In Persian]

9. Khoo EM, Lee WKh, Sararaks S, Abdul Samad A, Liew SM, Cheong ATh, et al. Medical errors in primary care clinics--a cross sectional study. BMC Family Practice. 2012; 13: 127. doi: 10.1186/1471-2296-13-127.

10. Alsulami SL, Sardidi HO, Almuzaini RS, Alsaif MA, Almuzaini HS, Moukaddem AK, et al. Knowledge, attitude and practice on medication error reporting among health practitioners in a tertiary care setting in Saudi Arabia. Saudi Medical Journal. 2019; 40(3): 246-51. doi: 10.15537/smj.2019.3.23960.

11. Abdel-Latif MM. Knowledge of healthcare professionals about medication errors in hospitals. Journal of basic and clinical pharmacy. 2016;7(3):87-92.

12. Ranchon F, Salles G, Späth H-M, Schwiertz V, Vantard N, Parat S, et al. Chemotherapeutic errors in hospitalised cancer patients: attributable damage and extra costs. BMC cancer. 2011; 11(1): 1-10. doi: 10.1186/1471-2407-11-478.

13. Al-Zaagi I, Al-Dossari DS, Salem SO, Qureshi NA. Medication safety unit programs in King Saud Medical City, 2012-2013: Safe medication management and use with a focus on patient safety. British Journal of Medicine Medical Research. 2015; 8(5): 384-407. doi: 10.9734/BJMMR/2015/17221.

14. Shimada Y, Fujimoto M, Nogami T, Watari H, Kitahara H, Misawa H, et al. Patient safety incident reports related to traditional Japanese Kampo medicines: Medication errors and adverse drug events in a university hospital for a ten-year period. BMC Complementary and Alternative Medicine. 2017; 17(1): 547. doi: 10.1186/s12906-017-2051-2.

15. Salimi S, Rahimi J, Bayazidi S. Nurses' experiences regarding error reporting process: Findings of a qualitative study. Nursing and Midwifery Journal. 2013; 11(6): 0-0. [In Persian]

16. Salavati S, Hatamvand F, Tabesh H, Salehi nasab M. Nurses' perspectives on causes of medication

errors and non- reporting at ED. Iran Journal of Nursing. 2012; 25(79): 72-83. [In Persian]

17. Wolf ZR, Hughes RG. Error Reporting and Disclosure. In: Hughes RG, editor. Patient Safety and Quality: An Evidence-Based Handbook for Nurses. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008 Apr. Chapter 35. Available from: https://www.ncbi.nlm.nih.gov/books/NBK2652/

18. Mirsadeghi A, Pazokian M. Barriers to reporting medication errors in Iran: A systematic review. International Journal of Medical Reviews. 2015; 2(4): 317-21. [In Persian]

19. Tabatabaee SS, Kalhor R, Nejatzadegan Z, Kohpeima Jahromi V, Sharifi T. Barriers to medication error reporting from nurses' perspective: A private hospital survey. International Journal of Hospital Research. 2014; 3(2): 97-102. [In Persian]

20. Yung HP, Yu Sh, Chu Ch, Hou ICh, Tang FI. Nurses' attitudes and perceived barriers to the reporting of medication administration errors. J Nurs Manag. 2016; 24(5): 580-8. doi: 10.1111/jonm.12360.

21. Amrollahi M, Khanjani N, Raadabadi M, Bagheri Hosseinabadi M, Mostafaee M, Samaei SE. Nurses' perspectives on the reasons behind medication errors and the barriers to error reporting. Nursing Midwifery Studies. 2017; 6(3): 132-6. doi: 10.4103/nms.nms_31_17. [In Persian]

22. Hwang J-I, Ahn J. Teamwork and clinical error reporting among nurses in Korean hospitals. Asian Nursing Research. 2015; 9(1): 14-20. doi: 10.1016/j.anr.2014.09.002.

23. Jember A, Hailu M, Messele A, Demeke T, Hassen M. Proportion of medication error reporting and associated factors among nurses: A cross sectional study. BMC Nurs. 2018; 17: 9. doi: 10.1186/s12912-018-0280-4.

24. Linda T. Kohn, Janet M. Corrigan, Molla S. Donaldson. To Err is Human: Building a Safer Health System. editor .Institute of Medicine (US) Committee on Quality of Health Care in America .Washington (DC): National Academies Press (US); 2000. DOI: 10.17226/9728

25. Donaldson LJ, Kelley ET, Dhingra-Kumar N, Kieny M-P, Sheikh A. Medication without harm: WHO's third global patient safety challenge. The Lancet. 2017; 389(10080): 1680-1. doi: 10.1016/S0140-6736(17)31047-4.

26. Vrbnjak D, Denieffe S, O'Gorman C, Pajnkihar M. Barriers to reporting medication errors and near misses among nurses: A systematic review. Int J Nurs Stud. 2016; 63: 162-78. doi: 10.1016/j.ijnurstu.2016.08.019.

27. Hartnell N, MacKinnon N, Sketris I, Fleming M. Identifying, understanding and overcoming barriers to medication error reporting in hospitals: A focus group study. BMJ Quality & Safety. 2012; 21(5): 361-8. doi: 10.1136/bmjqs-2011-000299.

28. Soydemir D, Seren Intepeler S, Mert H. Barriers to medical error reporting for physicians and nurses. Western Journal of Nursing Research. 2017; 39(10): 1348-63. doi: 10.1177/0193945916671934.

29. Lee E. Reporting of medication administration errors by nurses in South Korean hospitals. International Journal for Quality in Health Care. 2017; 29(5): 728-34. doi: 10.1093/intqhc/mzx096.

30. Lee J. Understanding nurses' experiences with near-miss error reporting omissions in large hospitals. Nursing Open. 2021; 8(5): 2696-704. doi: 10.1002/nop2.827.

31. Anderson JG, Abrahamson K, editors. Your Health Care May Kill You: Medical Errors. ITCH; 2017.

32. Hajimohammadi N, Sadeghi T, Hosseini SH. Evaluating the effect of an educational intervention for nursing managers on the rate of incidents reported at University Hospitals of Iran. Hospital Topics. 2018; 96(2): 47-53. doi: 10.1080/00185868.2017. [In Persian]

33. Stover J, Glaubius R, Kassanjee R, Dugdale CM. Updates to the Spectrum/AIM model for the UNAIDS 2020 HIV estimates. J Int AIDS Soc. 2021; 24 Suppl 5(Suppl 5): e25778. doi: 10.1002/jia2.25778.

34. Gleeson L, Dalton K, O'Mahony D, Byrne S. Interventions to improve reporting of medication errors in hospitals: A systematic review and narrative synthesis. Research in Social Administrative Pharmacy. 2020; 16(8): 1017-25. doi: 10.1016/j.sapharm.2019.12.005.

35. Kline R. Principles and practice of structural equation modeling. 5nd ed. New York: Guilford Press; 2010.

36. Shah R, Goldstein SM. Use of structural equation modeling in operations management research: Looking back and forward. Journal of Operations Management. 2006; 24(2): 148-69. doi: 10.1016/j.jom.2005.05.001.

37. Habibpour K, Safari R. Comprehensive guide to the use of SPSS in survey research. Edition. Tehran: MotafkaranPublishing; 2009. [In Persian]

38. Perez B, Knych SA, Weaver SJ, Liberman A, Abel EM, Oetjen D, et al. Understanding the barriers to physician error reporting and disclosure. Journal of Patient Safety. 2014; 10(1): 45-51. doi: 10.1097/PTS.0b013e31829e4b68.

39. Ghorbanpour Diz M, Mohammad khan Kermanshahi S, Sedaghat M. Evaluation of self-report of the medication errors and its barriers in pediatric wards. Iranian Nursing Scientific Association. 2016; 3(1): 71-80. [In Persian]

40. Yürür G, Ramirez Valdez KP. Disclosure of medical errors: A literature review and the situation in Turkey. Reports in Advances of Physical Sciences. 2018; 2(01): 1850003. doi: 10.1142/S2424942418500032.

41. Al-Ahmadi RF, Al-Juffali L, Al-Shanawani S, Ali Sh. Categorizing and understanding medication errors in hospital pharmacy in relation to human factors. Saudi Pharm 2020; 28(12): 1674-85. doi: 10.1016/j.jsps.2020.10.014.

42. Aeenparast A, Kheirandish M, Maftoon F, Farzadi F. Identifying key variables for designing a scheduling system for outpatient appointments: A systematic review. Payesh (Health Monitor) Journal. 2017; 16(6): 735-45. [In Persian]

43. Clapper TC, Ching K. Debunking the myth that the majority of medical errors are attributed to communication. Medical Education. 2020; 54(1): 74-81. doi: 10.1111/medu.13821.

44. Kee JWY, Khoo HS, Lim I, Koh MYH. Communication skills in patient-doctor interactions: Learning from patient complaints. Health Professions Education. 2018; 4(2): 97-106. doi: 10.1016/j.hpe.2017.03.006.

45. Benjamin MF, Hargrave S, Nether K. Using the Targeted Solutions Tool® to improve emergency department handoffs in a community hospital. The Joint Commission Journal on Quality Patient safety quality: An evidence-based handbook for nurses. 2016; 42(3): 107-AP4. doi: 10.1016/s1553-7250(16)42013-1.

46. Vermeir P, Vandijck D, Degroote S, Peleman R, Verhaeghe R, Mortier E, et al. Communication in healthcare: A narrative review of the literature and practical recommendations. International Journal of Clinical Practice. 2015; 69(11): 1257-67.

47. Jang S-J, Lee H, Son Y-J. Perceptions of patient safety culture and medication error reporting among early-and mid-career female nurses in South Korea. International Journal of Environmental Research Public Health. 2021; 18(9): 4853. doi: 10.3390/ijerph18094853.

48. Alshammari FM, Alanazi EJ, Alanazi AM, Alturifi AK, Alshammari TM. Medication error concept and reporting practices in Saudi Arabia: A multiregional study among healthcare professionals. Risk Management Healthcare Policy. 2021; 14: 2395. doi: 10.2147/RMHP.S281154.

49. Unal A, Intepeler SS. Medical error reporting software program development and its impact on pediatric units' reporting medical errors. Pak J Med Sci. 2020;36(2):10-5. doi: 10.12669/pjms.36.2.732.