

## Application of World Health Organization's Five Moments for Medication Safety Tool: An Intervention Towards Medication Without Harm

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### Abstract

**Background:** The Five Moments for Medication Safety tool are critical times when a patient's or caregiver's actions can significantly lower the risk of damage linked with their medication(s). **Aim:** This study aimed to: investigate the effectiveness of nurses' application of the World Healthcare Organization's Five moments for medication safety tool on patients' medication management in long-term care units. **Method:** an intervention research design was conducted/ A quasi-experimental study with two groups (nurses and patients), and a pre-test and post-test design was conducted. A sample included all nurses who were working in Long-Term Care Units at Alexandria' New Medical Center, Egypt (N= 55) and a proportional sample of 35 patients at Long-Term Care Units. The World Health Organization's Five Moments for Medication Safety tools were used to measure study variables. **Results:** there were significant differences between patients' and nurses' responses regarding their application of the World Health Organization's five moments for medication safety tool at the two evaluative times of intervention (pre and post) where ( $P = <0.001^*$ ). There was a positive significant correlation between nurses' and patients' outcomes in the overall responses especially in the Second Stage (Taking medication), and Fourth Stage (Reviewing medication) where ( $p = <0.001^*$ ). the intervention had a large effect on the overall patient outcome, with an effect size (of 0.873). **Conclusion:** When patients are informed about their drugs, encouraged to ask questions, and give good answers, they can play a critical role in minimizing medication errors. Additionally, nurses play a crucial role in medication management by involving, teaching, supporting, and involving all pertinent parties. For them to fulfill this duty, they need to be strengthened by ongoing education and training.

**Keywords:** World Health Organization, Five Moments for Medication Safety, Tool, Intervention, Nurses, Patients, Long-Term Care Units

### Introduction

The most crucial part of treatment is medication, but it also has the highest percentage of medical errors (Williams, 2007; Pham et al., 2012; World Health Organization (WHO), 2019). According to the World Health Organization, drug errors account for 6%–7% of all hospital admissions (World Health Organization (WHO), 2019) Each year, 1.5 million preventable pharmaceutical errors occur, according to the Institute of Medicine (IOM) (Aspden et al., 2007).

Nurses have a crucial role in the continuity of care and proximity to the patient, making them an important link between the physician and the patient or informal caregiver. The utilization of a comprehensive assessment and strategy by nurses can also assist in encouraging patients to engage in medication management. Nurses play a critical role in medication management by educating,

empowering, advocating for, and involving the patient and his family (Huisman et al., 2020).

According to the findings of Salar et al. (2020), nurses can make medication errors, but if they act professionally and have a professional attitude toward control systems, they can limit the number of medication errors by establishing technological techniques. In addition, nurses need to get frequent in-service training, and their performance should be continuously monitored. According to World Health Organization (WHO) (2019), Mohsin-Shaikh et al. (2014) Patients and families who are well-informed, knowledgeable, and empowered can make a significant contribution to their safety and well health, which includes avoiding, identifying, and minimizing medication-related harm. Patients who are informed well can make the best decisions about self-medication and health care.

Improved patient participation is needed in specialized practice settings to manage drugs since it reduces the harm to patients caused by

medication administration errors and the expense of such errors to patients and hospitals.(Mohsin-Shaikh et al., 2014) Increasing patient participation in medication management is thought to be a significant method for increasing medication management's safety and quality. A major transformation in the way doctors now offer care is required to achieve this strategy, specifically the inclusion of patients in routine medication administration(McTier et al., 2015).

Medication errors are a widespread occurrence that put a significant strain on healthcare systems, and they may often be avoided by employing efficient preventive techniques. The Five Moments for medication Safety tool are a key moment in the patient's or

caregiver's medication use that can considerably lower the chance of damage. 5 key questions are asked at each moment. Some are self-reflective for the patient, while others necessitate the assistance of healthcare providers to get truthful responses and reflections. As part of the WHO's Third Global Patient Safety Challenge, Medication Without Harm, this patient engagement tool was created in Figure (1). Its goal is to get patients more involved in their treatment, pique their interest in the medications they're taking, and give them the confidence to speak openly with their doctors. Patients, their families, and caregivers are encouraged to use this tool, at all levels of care and in all contexts, with the assistance of healthcare professionals (World Health Organization (WHO), 2019).



**Figure (1):** 5 Moments for Medication Safety. World Health Organization. WHO. (2017)

### Significance of the study

In Egypt, there are little data on drug mishaps. The paucity of data in Egypt is attributable to a dearth of study in this area and the lack of voluntary reporting systems, except for just a few hospitals. Although such issues do not exist in every health organization, some have previously addressed them, while others are still working to do so.(Shehata et al., 2016) To prevent medication errors and increase patient safety, nurses (who administer pharmaceuticals) must participate in educational and training programs on drug

therapy. A methodical approach is required immediately(Elden & Ismail, 2016).

According to Mutair et al. (2021), every medical institution should strive to establish procedures that prevent patients from being put in danger owing to medication errors. Healthcare organizations should investigate errors that have already occurred as well as those that may occur in the future. To monitor and measure pharmaceutical safety, a uniform organizational architecture is required. To build a culture of safety, it is critical to encourage reporting, monitoring, and open discussion of drug mishaps.

**Aim of the study:**

This study aimed to: investigate the effectiveness of nurses' application of the World Healthcare Organization's five moments for medication safety tool on patients medication management in long-term care units.

**Research objectives**

1. Assess nurses' and patients' application of five moments for medication safety tools before the training sessions (pre-test).
2. Develop and implement five moments for medication safety tool training sessions for nurses and patients.
3. Evaluate the effectiveness of the application of five moments for medication safety tools on nurses' and patients' medication management after the training sessions (post-test).

**1.2. Research Hypothesis: The following were the study's proposed hypotheses:**

Hypothesis 1: The application of the World Healthcare Organization's five moments for medication safety tools for patients and nurses will have significant effectiveness.

Hypothesis 2: There is a significant correlation between nurses' and patients' medication management before and after the application of the World Healthcare Organization's five moments for medication safety tool.

**Methodology****Research design and setting**

An intervention research design was conducted/ A quasi-experimental research study with two groups (nurses and patients), pre-test and post-test design was conducted. Pre-test and post-test design is a form of quasi-experimental research that allows for uncomplicated assessment of an intervention applied to a group of study participants. Pre-test and post-test design is also used in evaluations of participants attitudes or perceptions in applying the information

presented in a training session or with introduction of new concept (Stratton, 2019).

This is an intervention study conducted at Alexandria's new medical center; which is a public shareholding healthcare organization in Egypt engaged in the provision of medical diagnostic and treatment services in various medical sectors has the capacity of 300 beds and provides a range of medical services, including dialysis, oncology, blood diseases, gynecology, general surgery, pediatrics, internal disease, laboratory and radiology, ophthalmology, ear, and throat disease, outpatient clinics of various specialties, natural treatment unit, radiotherapy unit, intensive-care unit, and dental and oral surgery, among others.

**Study participants and sampling**

The subject of the study comprised all **nurses** (N = 60) working at dialysis, oncology, and blood disease units, who are dealing with medications daily and agreed to participate in this study. The "Epi info software version 7" was used to estimate the sample size, and it suggested a minimum sample size of (n= 52) nurses. Based on a variance of 5%, a level of 95% confidence, and a power of 0.80, the sample size was determined. The research had 55 nurses participate (response rate: 91.7%). This response rate was anticipated because the educational sessions on medication safety were created in response to their indicated training needs and the hospital administrator's invitation to conduct the training. By using the proportional allocation method, the total number of **patients** 25% hospitalized throughout the data collecting period and who have long-term medications with regular admission to long terms care units were selected randomly 35 patients had been invited to be interviewed; who agreed to participate in this study.

**Study instruments and technique**

**Nurses' five moments for medication safety tool:** The World Health Organization's five moments for medication safety tool was the basis for the researchers' development of a structured questionnaire.(Williams, 2007) The self-administered Scale is divided into two main sections:

**Section 1:** nurses' demographic and work variables questions including(age, gender,

working units, educational level, job title, years of experience, and number of educational training programs taken related to medication safety).

**Section 2:** includes 25 questions categorized under five main stages; each stage includes five questions, which assess nurses' promotion of patient engagement by introducing five moments for medication safety to their patients, and their families. Responses were made on a Likert scale five-point ranging from 1–5 (1 never, 5 always). Higher scores corresponded to a higher level of nurses' application of the World Healthcare Organization's five moments for a medication safety tool.

**Patients' five moments for medication safety tool:** In order to assess patient participation as part of the third WHO Global Patient Safety Challenge: Medication without Harm, researchers devised a face-to-face structured interview with patients based on the World Health Organization's five moments for medication safety tool (Williams, 2007). It is meant to support patients in taking a more active role in their care, foster their interest in the medications they are taking, and give them the confidence to speak freely with their healthcare providers. **This tool is divided into two sections.**

**Section one:** includes questions about patients' demographic data.

**Section two:** includes 25 questions categorized under five main stages (Starting a medication, taking medication, adding medication, reviewing medication, and stopping the medication). Where each stage includes five questions. Responses on tool two were measured using the a three-point yes (3), sometimes (2), and no (1). Higher scores indicated a higher level of patients' application of the World healthcare organization's Five moments for medication safety tool.

**N.B.** both study tools were used twice, pre-intervention and post-intervention to measure the outcome and effectiveness.

### Validity and reliability of the study tools

The two tools were created in English and then translated into Arabic to fit the Egyptian

culture and nurses' and patients' various educational levels. A panel of five academic experts was handed the questionnaire to assess the face validity and fluency of the translation. Some items were changed to make them clearer, based on their suggestions. A language expert re-translated the tools into English. To ensure accuracy and minimize any threats to the study's validity, the authors and specialists checked the re-translation. Pilot research was done on 5% of nurses ( $n = 5$ ) and also carried out with nurses from different units to assess tools for clarity and appropriateness; identify barriers and problems that may be encountered during the period of data collection with no change occurring. The interview guide was delivered to research colleagues to be reviewed and verified for its face validity and the result of all agreeing on the interview guide. Utilizing an interview guide was developed during a pilot interview before data collection to pretest the questions, assess the competency of the researcher with the interview technique, and adjustment of the questions as needed which was followed by data collection support. As a result, it took a few weeks to acquire the finished tool. The tools' internal reliability was also evaluated, and the findings showed that they were reliable, with a Cronbach's coefficient alpha for the questionnaire of 0.979 and the interview sheet of 0.957.

### Procedures

All participants in the study were informed of its purpose by the researchers once the research's goal had been approved by the ethical committee of Alexandria's new medical center. The study was carried out in five stages: World healthcare organization's Five moments for medication safety content development, pre-test, intervention application, post-test, and data analysis .

**In the first stage,** the content of the World Health Organization's Five Moments for Medication Safety Tool was designed based on patients' and nurses' needs assessment and the Global Patient Safety Challenge on Medication Safety. Educational sessions of the World Health Organization's Five Moments for Medication Safety Tool aimed to raise nurses' and patients' awareness of medication safety and medication without harm. The educational

sessions included the following topics: self-assessment (strengths and weaknesses), connecting self-understanding with the third challenge of the World Health Organization's Five Moments for Medication Safety Tool, factors that increased the occurrence of medication errors and how to prevent it, five main stages of medication safety (Starting a medication, taking medication, adding medication, reviewing medication, and stopping the medication), application of five moments for medication safety.

**In the second stage**, before the beginning of the sessions, the pre-test was performed by using the study tools. The researchers described the purpose of the study to all participants after receiving approval from the hospital. The tool was hand-delivered by the researchers to the nurses who participated in the study and were given specific instructions on how to complete it.

In the nursing unit office or patients' rooms before intervention, face-to-face structured interviews were done with patients. The researchers discussed the purpose of the study, the associated ethical issues, the estimated interview length, data confidentiality, and voluntary participation before each interview, then obtained the patient's informed consent to engage in the study. Because of the delicate nature of the subject, participants were given anonymity and the freedom to withdraw from the study at any time.

Based on the results of the assessment, **the third stage**, educational sessions of the World Health Organization's Five Moments for Medication Safety Tool were provided to nurses and patients. The nurses were divided into 5 groups, and each group included 10-11 nurses while patients were classified into 3 groups according to their hospitalized units, each group included 11-12 patients. Three awareness sessions were given to each group to cover the content. Each session was conducted for approximately two hours. To accommodate all participant groups, a total of 15 sessions for nurses and 9 sessions for patients were conducted. The educational sessions were designed to satisfy the nurses' and the patient's needs. The training classes were implemented for nurses and patients at the studied hospital by the researchers. Following those, classes were implemented for patients by the

trained nurses under the supervision of researchers. The following teaching methods were utilized: interactive lecture, discussion, brainstorming, and role play. The Media of teaching involved PowerPoint slides, flip charts, handouts, booklets, pamphlets, flyers, posters, and mobile applications (loaded onto a researcher's smartphone).

**In the fourth stage**, a post-test was done by using the pre-intervention tools (Nurses five moments for medication safety, and Patient's five moments for medication safety tools), to reveal the effectiveness in nurses, and patients' concerning medication safety after giving the five moments for medication safety intervention and to evaluate the alignment of the teaching sessions with the specific concepts and methods used in the research. Finally, in the fifth stage; data analysis was conducted.

#### Data collection

To collect the necessary data written approval was obtained from the administrators of the identified setting. The researcher collected data by using the study tools, which were distributed individually to the study participants before and after educational training sessions. To complete all tools each nurse took approximately 20 minutes and the interview length with patients ranged from 30–45 minutes. Educational sessions and data collection were coordinated with the nursing education department and health education department in the hospital to organize educational sessions according to workplace policy. Data were collected in 3 months, from September to November 2021.

#### Ethics approval and consent to participate

The Research Ethics Committee at the Faculty of Nursing, Alexandria University has approved the research on (November 15, 2022). The privacy of the participants was well protected. Only patients who signed the informed consent document attended the interview and participate in the program. Patients' names and personal identification information were secured by researchers. Also, this research was approved by the ethics committee of Alexandria's new medical center. The district nurses were informed that their participation was voluntary and that they can withdraw from the study at any time.

### Data analysis and management

Statistical Package of Social Science (SPSS) version 25 was used on an IBM personal computer to gather, tabulate, and statistically analyze the data. Numbers and percentages were used to describe the qualitative data. To ensure that the distribution's normality, the Kolmogorov-Smirnov test was applied. Using the mean and standard deviation, quantitative data were reported. The statistics listed below were used.

1. Descriptive statistics: qualitative data were provided as frequencies and percentages; descriptive statistics were in the form of mean percent score with standard deviation.
2. Analytical statistics: Paired t-test for normally distributed quantitative variables used to compare two periods, Wilcoxon signed ranks test for abnormally distributed quantitative variables, and the strength of the association between two variables is gauged by the correlation coefficients. The "Enter" method of multiple linear regression was used to predict the dependent outcome from independent factors using Pearson correlation. The strength of each independent predictor as a predictor even after correcting for the impact of other predictors in the model was assessed by comparing the unstandardized regression coefficient (beta) for each independent predictor to the beta of the standardized coefficient. With an alpha error of 0.05, two-tailed tests were used for all statistical analysis. P-values were categorized as non-significant (NS), significant (S), and highly significant (HS) depending on whether they were 0.05, below, or greater than.

### Results

**Table (1)** clarified that the mean age of nurses was  $31.33 \pm 7.72$  and 50.9 % of nurses were female. while the highest percentage of nurses (34.5 %) were working in hematology and oncology units; More than half of nurses were holding Bachelor's degrees in Nursing Science (50.9%). The mean years of experience of nurses in the hospital were  $4.99 \pm 3.42$  while in the department were  $3.66 \pm 2.67$ , respectively. 45.5 % of nurses received educational training programs related to medication safety inside the hospital and all nurses did not take any health educational

sessions related to the World Healthcare Organization's five Moments of Medication Safety tool.

**Table (2)** clarified that the mean age of patients was  $49.54 \pm 11.54$ . 54.3% of patients were female. The highest percentage of patients were married (65.7%), 45.7% of patients had a high level of education More than half of patients did not receive healthcare alone (62.9%) where husbands or wives may be attended to patients. 37.1% of patients visit the hospital more than 3 times per month. The highest percentage of patients (37.1%) received hemodialysis care, and the lowest percentage of them (14.3%) received radiotherapy. More than half of patients did not receive any health educational sessions related to medication safety by healthcare providers (54.3%), and all patients did not take any health educational sessions related to five moments of medication safety.

**Table (3)** indicated that there were significant effectiveness between nurses' and patients' regarding the application of World Health Organization's five moments for medication safety tool at the two evaluative times of intervention (pre and post) where ( $P < 0.001^*$ ). about nurses, the table illustrates that nurses' total mean score was  $42.36 \pm 17.10$  pre-intervention to  $72.73 \pm 16.27$  post-intervention where the highest stage was the Fifth Stage (Stopping medication) pre, and post ( $42.36 \pm 17.10$ ,  $72.73 \pm 16.27$ ), respectively; followed by the Second Stage (Taking medication) ( $36.91 \pm 17.41$ ,  $64.09 \pm 19.98$ ), consecutively. regarding the patients' response, it was evident that there is improvement in the total response as the total mean score was  $43.10 \pm 13.57$  pre-intervention to  $77.74 \pm 7.39$  post-intervention. moreover, the highest response for the first stage (Starting medication) was ( $52.0 \pm 14.91$ ) pre-intervention to be ( $85.43 \pm 8.52$ ) post-intervention; followed by the second stage (Taking medication) the mean was ( $44.29 \pm 22.92$ ) pre-intervention and modified post-intervention to ( $80.86 \pm 12.69$ ).

**Table (4)** illustrates that there was a positive significant correlation between nurses' and patients' effectiveness regarding the application of World Health Organization's five moments for medication safety tool in the overall responses and the Second Stage (Taking

medication), and in Fourth Stage (Reviewing medication) where ( $p = <0.001^*$ ).

**Table (5)** clarified that the intervention of the World Health Organization's five moments for medication safety tool had a large effect size on the overall patient effectiveness in medication management where the effect size (was 0.873). Meanwhile, this intervention had a medium effect size on nurses' effectiveness where an overall effect size (of 0.734).

**Table (6)** shows a multiple linear regression analysis designed to predict patients'

response to the World Health Organization's five moments for medication safety tool (as the dependent outcome) from the (independent predictor) nurses' implementation of the World Health Organization's five moments for medication safety tool. The model shows that the overall significance of the model was high where  $t = 31.184$ ,  $P = <0.001^*$ . as well, the second stage (Taking medication) intervention is the strongest independent predictor of nurses where  $\beta = 0.167$  and  $p\text{-value} = 0.001^*$ .

**Table (1):** Demographic and work-related characteristics of studied nurses (n = 55)

Demographic data	No.	%
<b>Age (years)</b>		
20 <30	25	45.5
30 < 40	22	40.0
40 <50	6	10.9
50+	2	3.6
Min. – Max.	20.0 – 52.0	
Mean $\pm$ SD.	31.33 $\pm$ 7.72	
<b>Gender</b>		
Male	27	49.1
Female	28	50.9
<b>Working Units</b>		
Oncology Unit	19	34.5
Hemodialysis Unit	17	30.9
Hematology Unit	19	34.5
<b>Educational Level</b>		
Technical Nursing Diploma	27	49.1
Bachelor of Nursing Science	28	50.9
<b>Job Title</b>		
Registered Nurse	27	49.1
Technical Nurse	27	49.1
Head Nurse	1	1.8
<b>Years of Experience in hospital</b>		
Min. – Max.	0.33 – 15.0	
Mean $\pm$ SD.	4.99 $\pm$ 3.42	
<b>Years of Experience in the department</b>		
Min. – Max.	0.17 – 12.0	
Mean $\pm$ SD.	3.66 $\pm$ 2.67	
<b>Number of educational training programs taken related to medication safety</b>		
0	26	47.3
1	25	45.5
2	2	3.6
$\geq 3$	2	3.6
<b>Place of Training (n = 29)</b>		
Inside the hospital	26	89.7
Outside the hospital	3	10.3
<b>Do you take any educational training programs related to the World Healthcare Organization's third Challenge 5 Moments of Medication Safety?</b>	0	0.0

SD: Standard deviation

**Table (2):** Demographic characteristics of studied patients (n = 35)

Demographic data	No.	%
<b>Age (years)</b>		
20 <30	2	5.7
30 < 40	6	17.1
40< 50	8	22.9
50+	19	54.3
Min. – Max.	22.0 – 68.0	
Mean ± SD.	49.54 ± 11.54	
<b>Gender</b>		
Male	16	45.7
Female	19	54.3
<b>Level of Education</b>		
Read and write	6	17.1
Moderate level of Education	13	37.1
High Level of Education	16	45.7
<b>Marital Status</b>		
Single	5	14.3
Married	23	65.7
Divorced	1	2.9
Widow	6	17.1
<b>Do you receive healthcare alone?</b>		
Yes	13	37.1
No	22	62.9
My wife	7	31.8
My husband	5	22.7
My sister	3	13.6
My brother	5	22.7
My daughter	1	4.5
My mother	1	4.5
<b>Number of visits to hospital per month</b>		
1	10	28.6
2	10	28.6
3	2	5.7
>3	13	37.1
Min. – Max.	1.0 – 12.0	
Mean ± SD.	5.0 ± 4.61	
<b>Type of service provided by the hospital</b>		
Hemodialysis	13	37.1
Chemotherapy	10	28.6
Radiotherapy	5	14.3
Blood Transfusion	7	20.0
<b>Do you take any health educational sessions related to medication safety by healthcare providers?</b>		
Yes	16	45.7
No	19	54.3
<b>Do you take any health educational sessions related to five moments of medication safety by healthcare providers?</b>	0	0.0

SD: Standard deviation

**Table (3):** Patients and nurses' mean percent scores at pre- and post-intervention of the World Health Organization's Global Patient Safety Challenge "five moments for medication safety"

Patients/ Nurses	Patients (N= 35)			Nurses (N= 55)		
	Pre-intervention % score $\pm$ SD	Post-intervention % score $\pm$ SD	$z_p$	Pre-intervention % score $\pm$ SD	Post-intervention % score $\pm$ SD	$z_p$
<b>Five Moments of Medication Safety</b>						
<b>First Stage</b> Starting medication	52.0 $\pm$ 14.91	85.43 $\pm$ 8.52	$p < 0.001^*$			$tp < 0.001^*$
<b>Second Stage</b> Taking medication	44.29 $\pm$ 22.92	80.86 $\pm$ 12.69	$p < 0.001^*$	38.64 $\pm$ 15.23	61.91 $\pm$ 16.96	$tp < 0.001^*$
<b>Third Stage</b> Adding a medication	47.14 $\pm$ 24.46	79.29 $\pm$ 14.20	$p < 0.001^*$	36.91 $\pm$ 17.41	64.09 $\pm$ 19.98	$tp < 0.001^*$
<b>Fourth Stage</b> Reviewing medication	38.29 $\pm$ 21.89	75.71 $\pm$ 9.48	$p < 0.001^*$	29.77 $\pm$ 17.39	63.30 $\pm$ 21.38	$tp < 0.001^*$
<b>Fifth Stage</b> Stopping medication	34.57 $\pm$ 19.15	67.71 $\pm$ 17.16	$p < 0.001^*$	34.18 $\pm$ 15.72	63.91 $\pm$ 18.92	$tp < 0.001^*$
<b>% Score overall</b>	43.10 $\pm$ 13.57	77.74 $\pm$ 7.39	$p < 0.001^*$	42.36 $\pm$ 17.10	72.73 $\pm$ 16.27	$tp < 0.001^*$

Z: Wilcoxon signed ranks test

t: Paired t-test \*: Statistically significant at  $p \leq 0.0$ **Table (4):** Correlation Matrix between nurses' and patient's responses to the World Health Organization's Global Patient Safety Challenge "five moments for medication safety"

Nurses	Patients			
	Pre-intervention		Post-intervention	
	r	p	r	p
<b>First Stage</b> Starting medication	0.215	0.115	0.072	0.601
<b>Second Stage</b> Taking medication	0.249	0.067	0.549*	$< 0.001^*$
<b>Third Stage</b> Adding a medication	0.030	0.826	0.136	0.323
<b>Fourth Stage</b> Reviewing medication	0.287*	0.034*	0.421*	0.001*
<b>Fifth Stage</b> Stopping medication	0.070	0.610	0.257	0.058
<b>Overall</b>	0.159	0.245	0.452*	0.001*

r: Pearson coefficient

\*: Statistically significant at  $p \leq 0.05$ **Table (5):** Impact / Effect of the World Health Organization's Global Patient Safety Challenge "five moments for medication safety" on patients and nurses

	Pre-intervention Mean $\pm$ SD.	Post-intervention Mean $\pm$ SD.	Mean Change	Effect size	Level
<b>Patients</b>					
<b>First Stage</b> (Starting medication)	52.0 $\pm$ 14.91	85.43 $\pm$ 8.52	33.43	0.823	Large
<b>Second Stage</b> (Taking medication)	44.29 $\pm$ 22.92	80.86 $\pm$ 12.69	36.57	0.778	Medium
<b>Third Stage</b> (Adding a medication)	47.14 $\pm$ 24.46	79.29 $\pm$ 14.20	32.14	0.579	Medium
<b>Fourth Stage</b> (Reviewing medication)	38.29 $\pm$ 21.89	75.71 $\pm$ 9.48	37.43	0.775	Medium
<b>Fifth Stage</b> (Stopping medication)	34.57 $\pm$ 19.15	67.71 $\pm$ 17.16	33.14	0.656	Medium
<b>Overall</b>	<b>43.10 <math>\pm</math> 13.57</b>	<b>77.74 <math>\pm</math> 7.39</b>	34.64	0.873	Large
<b>Nurses</b>					
<b>First Stage</b> (Starting medication)	38.64 $\pm$ 15.23	61.91 $\pm$ 16.96	23.27	0.531	Medium
<b>Second Stage</b> (Taking medication)	36.91 $\pm$ 17.41	64.09 $\pm$ 19.98	27.18	0.572	Medium
<b>Third Stage</b> (Adding a medication)	29.77 $\pm$ 17.39	63.30 $\pm$ 21.38	33.52	0.706	Medium
<b>Fourth Stage</b> (Reviewing medication)	34.18 $\pm$ 15.72	63.91 $\pm$ 18.92	29.73	0.646	Medium
<b>Fifth Stage</b> (Stopping medication)	42.36 $\pm$ 17.10	72.73 $\pm$ 16.27	30.36	0.656	Medium
<b>Overall</b>	<b>36.65 <math>\pm</math> 11.78</b>	<b>65.27 <math>\pm</math> 15.97</b>	<b>28.62</b>	0.734	Medium
Effect size 0.0 – 0.2 Small effect      0.3–0.7 Medium effect $\geq 0.8$ Large effect					

**Table (6):** Best fitting multiple linear regression model for nurses toward the World Health Organization's Global Patient Safety Challenge "five moments for medication safety" (Post-intervention)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
Independent Variable: Nurses	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	72.873	2.337		31.184*	<0.001*	68.177	77.569
First Stage (Starting medication)	-0.034	0.031	-0.151	1.105	0.275	-0.095	0.028
Second Stage (Taking medication)	0.167	0.048	0.884	3.493*	0.001*	0.071	0.263
Third Stage (Adding a medication)	-0.009	0.048	-0.052	0.190	0.850	-0.107	0.088
Fourth Stage (Reviewing medication)	-0.007	0.045	-0.034	0.150	0.881	-0.098	0.084
Fifth Stage (Stopping medication)	-0.052	0.043	-0.226	1.225	0.226	-0.138	0.034
<b>Dependent Variable: Patient</b>							
$R^2 = 0.365$ , $F = 5.638^*$ , $p < 0.001^*$				F, p: f, and p values for the model			
R <sup>2</sup> : Coefficient of determination				B: Unstandardized Coefficients			
SE: Estimates Standard error				Beta: Standardized Coefficients			
t: t-test of significance				*: Statistically significant at $p \leq 0.05$			

## Discussion

Thomas et al. (2019) conducted a systematic review and found 50 papers, the majority of which were from Iran, Saudi Arabia, Egypt, and Jordan. Thirty-two studies quantified pharmaceutical errors, which included lack of understanding, insufficient staff numbers, and a common severe workload. according to Manias et al. (2020) medication errors can occur at any stage of the medication management process and are a leading cause of mortality and damage worldwide. It contributes to negative events that endanger patient safety and place a major financial strain on the healthcare system. The drug management phase, which includes monitoring the effectiveness and side effects, is handled by nursing. Effective management and boosting nurses' knowledge of drug management are two of the many measures offered to prevent medication errors (Abdulmutalib & Safwat, 2020). By informing, supporting, representing, and including all relevant stakeholders, nurses may and should play a significant role in medication management. Nurses' input should be valued when it comes to improving patient medication management. Nurses can encourage patients to take an active role in their drug management. So, they should be reinforced by education and training to take up this role (Huisman et al., 2020).

The present study aimed at evaluating the effectiveness of nurses' application of the World healthcare organization's five moments for medication safety tool on patients in long-term care units within a sample composed of fifty nurses whose mean age was  $31.33 \pm 7.72$  more than half of them were female. who are working

in hematology, oncology; and hemodialysis units at Alexandria New Medical Center. More than half of nurses are holding a Bachelor's degree in Nursing Science, while 49.1% had Technical Nursing Diploma. Less than half of nurses received educational training programs related to medication safety inside the hospital and any nurses did not take any health educational sessions related to the World Healthcare Organization's five Moments of Medication Safety tool. As well the sample included the patients who are hesitating on the previously mentioned units and have long-term medications courses with a total number of 35 patients. nearly half of them were female and had a high level of education, all patients are Egyptian. The highest percentage of patients are married, more than half of them cannot receive healthcare alone where husband or wife attended to them. 37.1% of patients visit the hospital more than 3 times per month. More than half of the patients did not receive any health educational sessions related to medication safety by healthcare providers, and all patients did not take any health educational sessions related to five moments of medication safety.

## The third WHO Global Patient Safety Challenge: Medication without Harm

Despite global breakthroughs in healthcare, one out of every ten patients is still harmed while undergoing treatment (Jha et al., 2013). The World Health Organization (WHO) released the statement "Medication Without Harm, WHO Global Patient Safety Challenge" in March 2017 (Donaldson et al., 2017; World Health

Organization (WHO), 2017). It required action to reduce patient harm brought on by risky drug usage and prescription mistakes. WHO requests that nations make effective action to raise pharmaceutical safety a key priority. Improvement actions are necessary to meet the goals. To achieve the objective of the third WHO Global Patient Safety Challenge: Medication Without Harm, which is to decrease severe, preventable medication-related harm, key components of programs include implementing formal structured processes with improved workforce capability to deliver medication, partnering with patients and families, improving information quality and availability, and prioritizing this area for early and sustained action over the next five years. As part of this challenge, the WHO created the "Five moments for medication safety" patient engagement tool, which focuses on five crucial situations where the patient and healthcare professionals can take action to lower the risk of medication-related harm: Starting a medication, taking it, adding it, reviewing it, and stopping the medication are all examples of medication-related actions (Williams, 2007).

**The efficiency with which nurses and patients manage their medication while using the five moments for medication safety tools.**

Findings of the present study support the WHO challenge as it indicated a significant difference between patients and nurses' outcomes regarding medication safety after application of the World Health Organization's five moments for medication safety tool at the two evaluative times of intervention (pre and post) where ( $P = <0.001^*$ ). Regarding the patients' outcomes, it was evident that there is improvement in the total patients' responses, the highest response was for the first stage (Starting medication); followed by the second stage (Taking medication). About nurses, findings illustrated that nurses' total mean score was improved post-intervention where the highest stage was the Fifth Stage (Stopping medication); followed by the Second Stage (Taking medication).

Exploratory descriptive research by Subakumar et al. (2021) concluded that patients valued the Five Moments for Medication Safety tool and that it should be implemented in clinical practice. Healthcare practitioners need to play a

role in including patients and assisting them in incorporating the questions into consultations because 83 percent of patients found the tool to be extremely helpful. According to Mutair et al. (2021), healthcare organizations must create a positive environment if medication utilization is to become a safer practice. Dijkstra et al. (2021) create a competency framework for nurses in pharmaceutical care, which runs counter to these findings. They also suggest that future research should concentrate on integrating these capabilities into nursing education. According to Park and Seomun (2020) a systematic strategy and organizational effort are required to increase pharmaceutical safety in clinical practice.

When it comes to patient care and medication safety, nurses are the most important medical professionals. Organizational risks were associated with educational requirements and healthcare practitioners' knowledge of safety issues, according to Bengtsson et al. (2021), but a shortage of employees and insufficient time to deliver safe care are also seen as safety risks. To examine the characteristics of the work organization performed by the nursing staff regarding medication administration procedures and their implications on their workload and patient safety, Magalhães et al. (2019) conducted an exploratory and ecological restorative approach study on three inpatient units of a teaching hospital in the south of Brazil.

It should be emphasized that the results of this study can be used to assess the workload of nursing staff and the safety of drug administration procedures in the Brazilian healthcare system. In a similar vein, Heczkova and Bulava (2018) stated that to guarantee safe care, it is important to pay much more attention to the number of nursing specialists on the nursing team at specialized workplaces, the extent of nursing education in medical management, and the style of nursing training. In nursing practice, medication-related tasks are crucial to getting patients good therapeutic results. The administration of medication has been noted as one of the most frequent activities during nursing staff work shifts, which affects the workload of these specialists. (de Magalhães et al., 2013; Magalhães et al., 2015) Medications are one part of a client's treatment regimen. Before administering drugs, nurses must ensure that they have the necessary skills and expertise to do it safely. When providing drugs,

evidence-based best practices should be followed. Nurses must be aware of their limitations and seek assistance when required.(Health Care Association of New Jersey, 2012)

The research of Mulac et al. (2021) comprised 3372 reports from the Norwegian Incident Reporting System, which revealed that the majority of drug mistakes happened during administration (68 percent) and prescribing (38 percent) (24 percent). Dosing mistakes (38 percent), omissions (23 percent), and incorrect medications were the most common forms of errors (15 percent). They concluded that pharmaceutical mistakes were more prevalent during drug delivery. The most prevalent sort of mistake was dosing problems. Medication management necessitates assessment, planning, preparation, implementation, administration, evaluation, and documentation.(College of Licensed Practical Nurses of Alberta, 2021) In one long-term rehabilitation center, Studer et al. (2021) designed a program that focused on enhancing patients' independence and self-care. Patients learned to manage their medications two to three months before discharge. Patients were first watched by a nurse as they prepared their medications, frequently using a pillbox, to assess their capacity to handle their medications on their own. According to the findings, measures such as patient counseling and dialogue with healthcare practitioners are highly suggested. Medication management, according to the Canadian Patient Safety Institute (CPSI), is "patient-centered care that optimizes safe, effective, and appropriate pharmacological therapy administered in conjunction with patients and their health care team(s)".(Canadian Patient Safety Institute (CPSI), 2016)

#### **Correlation between nurses' and patients' outcomes after the application of the World Healthcare Organization's five moments for medication safety tool.**

Our findings demonstrate that there was a positive significant correlation between nurses' and patients' outcomes in the overall responses, especially in the Second Stage (Taking medication) and Fourth Stage (Reviewing medication), where ( $p = 0.001^*$ ), regarding the application of the World Health Organization's five moments for medication safety tool. This conclusion could be explained by the fact that

each patient's pharmaceutical experience and clinical results were optimized when they understood, concurred with, and actively participated in the drug regimen. Additionally, after receiving training, nurses attempt to involve patients and families in creating a comprehensive and precise medication system. All of the patients' drugs, both prescribed and over-the-counter, must be brought in. Nurses in the practice work with patients and their families to build a thorough and accurate medication safety strategy. These include non-oral medications including injections, inhalers, ointments, and drops, as well as medications they only take rarely. In the McTier et al. (2015) study on patient engagement in drug safety, every patient had modified their prescription regimen. This required initiating fresh pharmacological regimens and ending old ones. Their capacity to provide a thorough list of their current medicines and explain the function and side effects was consequently less than their preintervention knowledge Comprehensive medication management, according to McInnis et al. (2012) should comprise a customized care plan that meets the therapy's stated aims with adequate supervision and follow-up to evaluate actual patient results.

Patients may be crucial contributors to reducing medication errors if they are given information about their medications and encouraged to ask questions and seek suitable answers. Patients should be taught how to avoid prescription errors and included in quality improvement and safety initiatives because they are the final link in the chain (Ibrahim & Mohamed, 2022). Regarding the intervention's effect size, it was clear that the World Health Organization's five moments for medication safety tool had a significant impact on the final results for all patients (0.873). On nurses' outcomes, this intervention had a medium effect size, whereas the total effect size (was 0.734) (Rebolledo et al., 2022).

In response to criticism of this finding, Alqenae et al. (2020) asserted that most of the research included in their analysis came from developed nations (specifically, the United States and the United Kingdom), with scant information from underdeveloped nations (for example, Africa and South America, where there was only one study) demonstrating low levels of patient support after discharge. In addition, countries that

included a lot of research in their study, except the United States, rarely had data for all of our outcome indicators. Additionally, they referenced a recent systematic review and meta-analysis of preventable harm in healthcare around the world, which indicated a pooled incidence of 6% with medicines as the primary cause of harm. Between 11 and 16 percent of patients who were released had preventable adverse drug events, according to only two studies. More studies on the occurrence and root causes of avoidable adverse medication events would be beneficial for the WHO's Third Global Patient Safety Challenge: Medication Without Harm.

### **The outcomes of a multiple linear regression analysis intended to forecast how patients will react to the WHO's five moments for medication safety tool.**

The findings of the current study indicated that the model's overall significance was high. It was designed to predict patients' responses to the World Health Organization's Global Patient Safety Challenge's "five moments for medication safety" (as the dependent outcome) from the nurses' implementation of the challenge's independent predictor, which is the nurses' implementation of the challenge's "five moments for medication safety." Additionally, the second stage (Taking medication) intervention, with  $\beta = 0.167$  and  $p\text{-value} = 0.001$ , is the strongest independent predictor of nursing. Hajibeglou et al. (2018) conducted a quasi-experimental study on nurses working at a hospital associated with Golestan University of Medical Sciences, and a sample of 40 nurses at this hospital's emergency department was chosen by a census. A two-day workshop serving as a patient safety training program was created and offered to the chosen emergency nurses. The majority of nurses (80.62%) scored low on the frequency of medication errors, according to the results; after the training, a much higher percentage of nurses (90.31%;  $P 0.001$ ) scored low on this index. The analyses demonstrated the efficiency of the patient safety training program for nurses and concluded that retraining programs on safe medication administration are required due to nurses' substantial contribution to the reduction of medication errors. Beyond these conclusions, the Maryland Board of Nursing specifies prescription drug delivery standards. These standards, which

are part of the nurse practice legislation, define medication administration as a nursing act. Before posting a new medicine or stopping an old one, patients should notify the nurse whenever a new drug is prescribed, an old one is ended, or a new one is altered. When a mistake with medication has happened, as well as when a new medication does not specify a clock time (M-Howell, 2014).

### **Conclusions**

The findings of the present study support the World Health Organization's five moments for medication safety tools. The study revealed significant differences between patients and nurses' outcomes regarding medication safety at the two evaluative times of intervention (pre and post). There is an improvement in the total patients' response, the highest response was for the first stage (Starting medication); followed by the second stage (Taking medication). Nurses' total mean score was improved post-intervention where the highest stage was the Fifth Stage (Stopping medication); followed by the Second Stage (Taking medication). There was a positive significant correlation between nurses' and patients' outcomes in the overall responses especially in the Second Stage (Taking medication), and in Fourth Stage (Reviewing medication). Also, the outcomes of a multiple linear regression show that the overall significance of the model was high. In addition, the second stage (Taking medication) intervention is found to be the strongest independent predictor of nurses.

### **Recommendations**

#### **Findings of the present study proposed that,**

- The World Health Organization's Five Moments for Medication Safety tool had a significant influence on patient medication management and was recommended for use in various healthcare settings in Egypt.
- The safe administration of medication can be ensured by creating policies based on the World Health Organization's Five Moments for Medication Safety and making them accessible to all units and healthcare professionals.
- A sufficient number of skilled nurses and pharmacists should be on hand at all times to

ensure that patients in intensive care units receive the best possible treatment.

- Patients should be engaged by healthcare professionals (physicians, nurses, and pharmacists), who should assist them in incorporating the World Health Organization's Five Moments for Medication Safety tool into consultations.
- Medication administration includes a significant amount of client education. Whether medicine is given to a patient at a hospital, a clinic, a client's home, or when they are discharged from the hospital, it is the responsibility of the health care providers to ensure that the patient gets all the information they need concerning the medication(s) they are getting.
- The name of the medicine, its purpose, expected effects, appearance, directions for taking the medication, correct storage, and any cautions such as side effects or unfavorable effects due to abrupt discontinuation of medication should all be included in client education.
- Client teaching can be supplemented by handouts and brochures; however, health care providers should ensure that all client teaching, including the client's grasp of the material delivered, is noted in the client's chart.
- Further research is recommended related to the application of the World Health Organization's Five Moments for Medication Safety tool in Egyptian different care settings.

#### Declarations

#### Abbreviations

WHO: World Health Organization;

IOM: Institute of Medicine;

CPSI: Canadian Patient Safety Institute.

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