"How to Use Quality Tools to Eliminate Medication Errors "

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ABSTRACT

Medication errors are errors that doctors, caregivers, pharmacists, and patients make when prescribing, using, or storing drugs. Medication errors may lead to disease in children, disease exacerbation. In the United States, medication errors cost healthcare about $ 177 billion (statistically speaking) annually. (1)

The published studies estimated that about 5-10% of hospital admissions were due to the medication errors. It is suspected that approximately 3% of deaths in the Swedish population are because of the medication errors. In Canada, up to 50% of the patient safety indicates in primary care are related to medication errors. (2)

Aim of the study: Attempting to prevent medication errors inside health care facilities to raise health care efficiency and maintain patient safety

Methodology : Using of quality tools like brain storming, process mapping, and fish bone diagram, and the check list helped us to identify the most common causes of medication errors and finding probable solutions. (3)

Conclusion: A standard protocol for the medication management must be performed to reduce medication error

Key Wards:-

Medication – errors – patient – quality tools – health care provider – pharmacy

Introduction:

A medication error is defined as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is control of health care professionals, patients, or consumers", according to the national coordinating council for medication error reporting prevention.

Serious harmful results of a medication error may include:
Death , life threatening situation , disability & birth defect (4)

Types of medication error

1- ordering error (physician)

No valid indication.
Ex: Newly diagnosed type 2 DM humlog mix prescribed as the first anti-diabetic medication

Therapeutic duplication
ex: prescribed 2drugs from the same or different class without additional benefit like: - Augmentin and unsayn at the same time

Indication without medication
physician didn't initiated drug that is needed to manage patient condition. Like: DM patient came for dispensing antihypertensive drug only!

Preventive drug is required to reduce risk of developing a new condition.
Pregnant women need oral iron supplement in 2nd, 3rd trimester – folic acid in 1^{st}trimester

Abrupt discontinuation of drug that should be gradually with drawn
like: corticosteroids for 3 months bisoprolol

2-1 Allergy.
Physician prescribed drug for patient that is known to be allergic to. Like ampicillins, sulfa, penicillin.

2-2Drug Contraindication (Absolute)
Like: apixaban in pregnancy, warfarin with bleeding

2-3 Wrong Rout of Administration or Dosage Form
-a route by which drug can never be given
-a dosage form that is not available by manufacturer
-a route /dosage form that is not appropriate for condition. Like: Amikin vial used orally, gentamicin tablets, oral antiemetic for active emesis, tablets for years' old.

2-4 Drug is not The Most Effective for This Condition
like: - antibiotics (limited in 1ry care)

2-5 alert / Warring due to risk factors
 like anti-diabetics in fasting

3-0 Drug interaction (x OT avoid)

Like: Amiodarone + Clarithromycin

4-1 wrong Dosing Regimen (dose/frequency)
Like: - Lantus 3 times daily, Tresiba twice, Apidra once (despite 3 regular meals)
-dose not adjusted in renal failure.

4-2 Wrong Duration
physician wrote duration that is too long or short.
Like -apixaban 2drugs!
- azithromycin for 20 drugs!

5-1 Wrong Administration Rate:
 in IV fluids limited in 1ry care

5-2 Wrong Dilution Instructions.
That makes drug too concentrated or diluted than reference. Like in highly concentrated medications

5-3 Wrong Compatibility Instructions (limited in 1ry care) sodium bicarbonate diluted in normal saline, phenytoin in normal saline (uncertain)

6-0 Wrong Patient.
Physician wrote a treatment for a patient in the sheet of anther.

7-0 Incomplete or Wrong Patient Information
like Name - Number- Age -Weight – H t history diagnosis

8-0 Wrong Drug Name.
Physician intended to write a drug but falsely wrote name of another drug

9-0 Illegible Hand Writing. UN clear hand writing

10-0 Wrong Strength. Wrote strength that is not available by manufacturer and can't be used.
Like: - metformin 100mg, clarithromycin 1 GM

11-0 UN Approved Abbreviations. Like mustard 30 it

12-0 Wrong Decimal Point

13-0 In Complete Prescribing Instructions.
Like: - dose – concentration – duration – dilution – instructions are not writing at all

2- Dispensing Error (pharmacist)

1- Wrong Patient ex mix up 3 different prescription dispensed at the same time. 3 Mohamed

2- Wrong Label.

3- Wrong Drug. Dispensed a drug that is different from the originally prescribed.

4- Wrong Quantity/Strength dispensed quantity /strength that is different from the originally prescribed

5- Wrong Dosage Form.

6- Expired /Deteriorated Medication.

7- Omission. Missing drug!

8- Omission Due to Shortage

9- Discontinued Medication

10- Others

3- Preparation Errors.

1- wrong drug label

2- wrong dilution

3- incompatibility error

4- procedure of preparation

4- Administration Error

1- Wrong Patient nurse gave the drug of one patient to another

2- Wrong Drug nurse dispensed from stock and administrated another drug that looks similar to the prescribed drug

3- Wrong Dose /Frequency nurse gave the drug with dose /frequency that differs from what is the originally prescribed in the order

4- Wrong Administration Time nurse gave the drug with liming that differs from what is the originally prescribed in the order (not prescribing error)

5- Wrong Route of Administration. Nurse gave the drug with rout that differs from what is the originally prescribed in the order

6- Wrong IV Flow Rate

7- Wrong Administration Technique /Wrong Special Instructions

8- Not Applicable In PHC

9- drug omission nurse didn't give that is prescribed and dispensed.

10- nurse repeated administration of the same drug

Responsible nurse, another nurse or patient duplicated administering the same drug

11- Nurse Signature Error.

12- Nurse Gave Medication without Physician Order

5- Storage Error (Pharmacist -Nurse)

1- wrong storage condition

2- others

6- Monitoring Errors

1- required monitoring not orders (CI and DI that required) ex:- warfarin and INR.

2- monitoring ordered but not performed

Methodology: -
The research team used many quality tools as the following:

1-the brain storming: tool that provides away of creatively generally ahigh volume of ideas on any topic by creating atmosphere free from criticism and judgment .-Allow every one of the research group to offer possible causes of the medication errors and documented each of them .

2-processmapping: -a tool shows a series of events that produce an end and result .it shows the steps of medication delivery to the patient.

3-fish bone diagram: -tool to enhance the ability of the team to map the full range of possible root causes in order to reach the solutions.as the problem of medication errors is the fish head and the main causes in the fish bones each main cause has many sub causes.
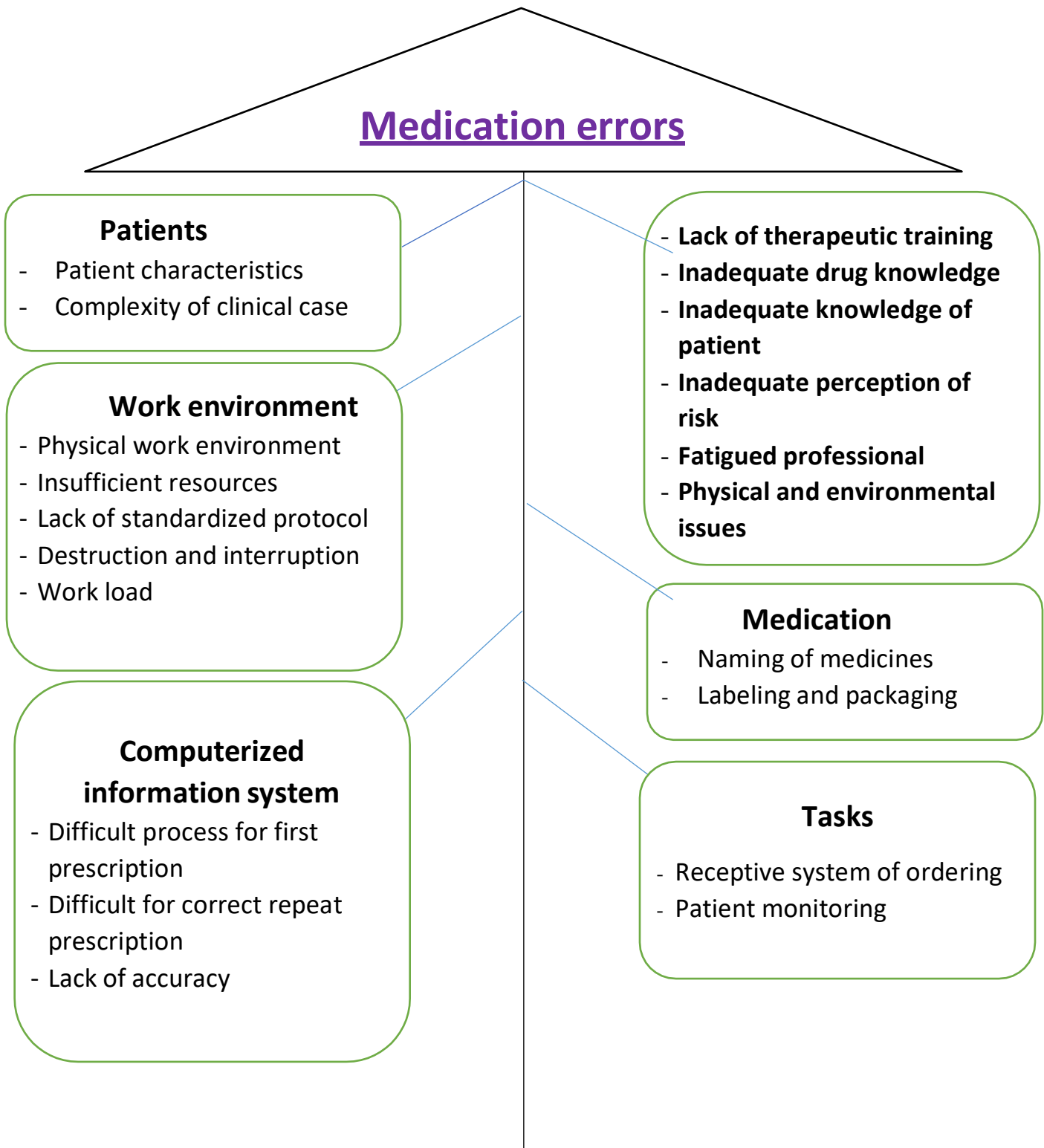
4-We have done a study in a unit of daily frequency 320 cases. after applying the medication management safety standards. we found a decrease in the number of medication errors for patient and it becomes one or zero errors per month.

Result:

Cycle of the medication process

Ordering medication

Prescribing

Dispensing

Medication use process

monitoring

Administration
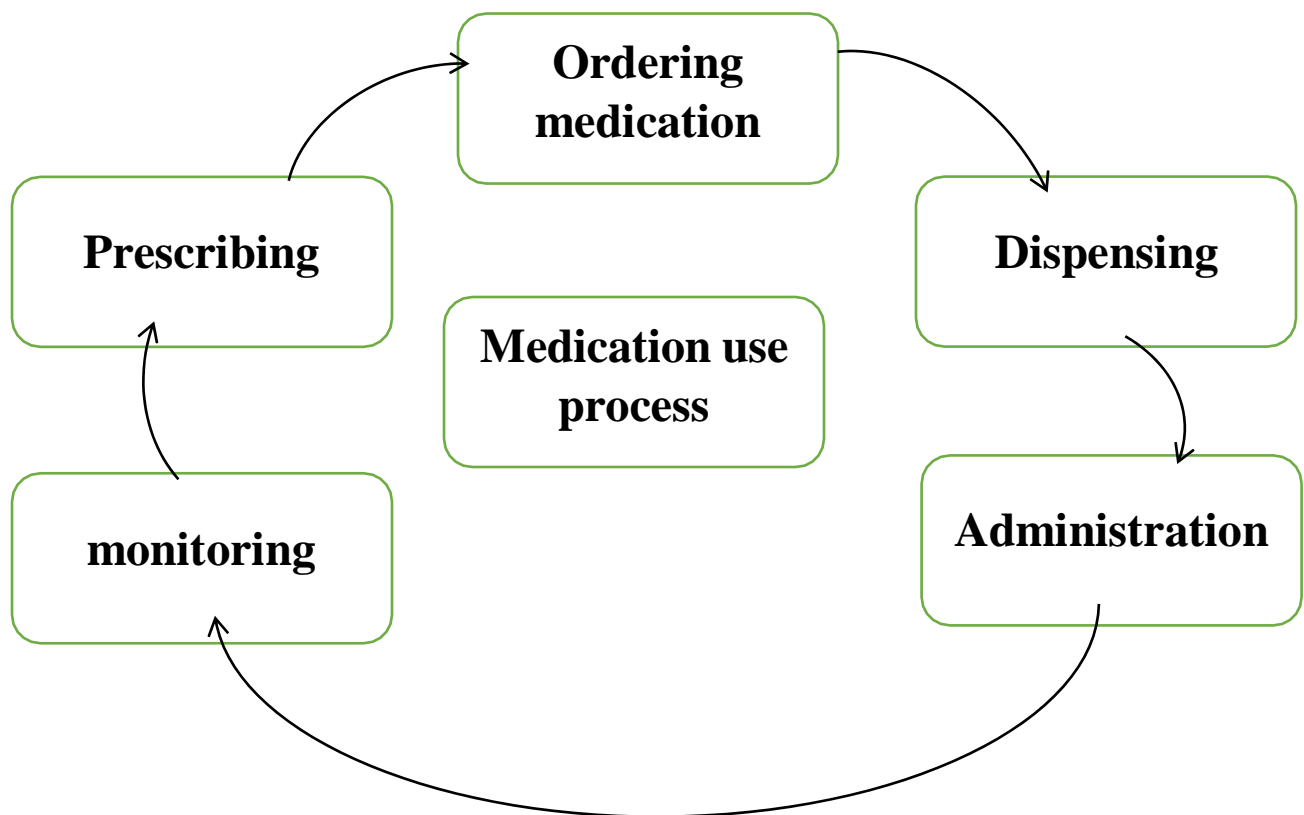
Medication error can occur at any time between when a clinician prescribes a medication and a patient receives the drug.

Medication errors

Patients
- Patient characteristics
- Complexity of clinical case

Work environment
- Physical work environment
- Insufficient resources
- Lack of standardized protocol
- Destruction and interruption
- Work load

Computerized information system
- Difficult process for first prescription
- Difficult for correct repeat prescription
- Lack of accuracy

- **Lack of therapeutic training**
- **Inadequate drug knowledge**
- **Inadequate knowledge of patient**
- **Inadequate perception of risk**
- **Fatigued professional**
- **Physical and environmental issues**

Medication
- Naming of medicines
- Labeling and packaging

Tasks
- Receptive system of ordering
- Patient monitoring

(5)

Bar chart showing medication error in different setting in al-herafeen health care unit, revealing that the percentage of errors found in the pharmacy
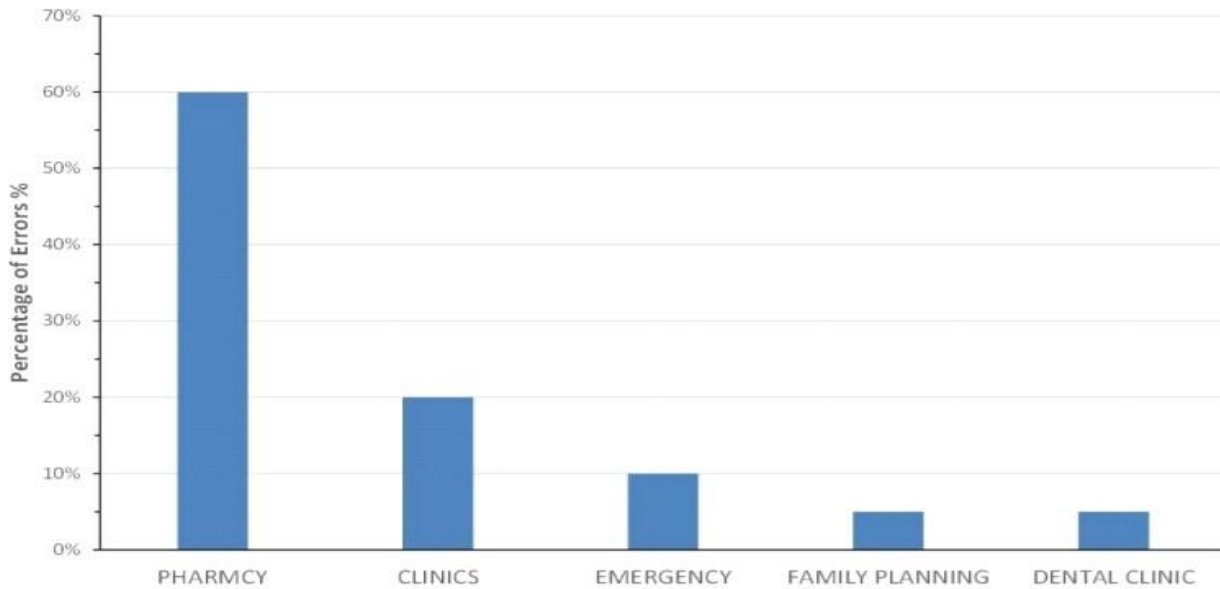
reached 60% of the medication error in the whole unit

Chart (4) : Bar Chart showing Percentages of causes of medication errors in pharmacy of Al-HERAFEEN Healthcare Unit

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(6)
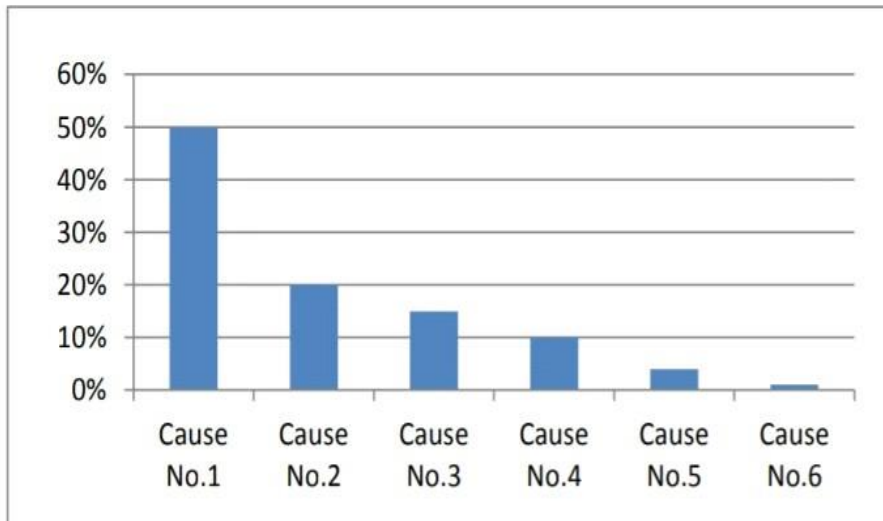
Medication management Safety Standards: -

A-PS.18		M		N	NA
Standard: **Policy & Procedures for medication management safety include at least the following:**					

PS.18.1	Abbreviations not to be used throughout the organization (Refer to standard PS.21).
PS.18.2	Documentation and communication of patient's current medications & discharge medication.
PS.18.3	Labeling of medications, medication containers and other solutions.
PS.18.4	Prevent errors from high risk medications.
PS.18.5	Prevent errors from look-alike, sound-alike medications.

A-PS.19		M		N	NA
Standard: **The Policy to prevent errors from high risk medications defines:**					

PS.19.1	The list of high risk medications including concentrated electrolytes.
PS.19.2	Labeling and storage of high risk medications.
PS.19.3	Dispensing and preparation of the high risk medications.
PS.19.4	Frequency of reviewing and updating of the list.

A-PS.20		M		N	NA
Standard: **The Policy to prevent errors from look-alike, sound-alike medications defines the following:**					

PS.20.1	The list of look-alike, sound-alike medications.
PS.20.2	Labeling and storage of look-alike, sound-alike medication.
PS.20.3	Dispensing and preparation of the look-alike, sound-alike medication.
PS.20.4	Frequency of reviewing and updating of the list.

A-PS.21	M	P	N	NA

Standard:
Abbreviations not to be used throughout the organization are:
U/ IU
Q.D., QD, q.d., qd
Q.O.D., QOD, q.o.d., qod
MS, MSO4
MgSO4
Trailing zero
No leading zero
Dose x frequency x duration

B-PS.22	M	P	N	NA

Standard:
Look-alike and sound-alike medications are identified, stored and dispensed to assure that risk is minimized.

B-PS.23	M	P	N	NA

Standard:
Concentrated electrolytes; including, but not limited to, potassium chloride (2 meq/L or greater concentration), potassium phosphate, sodium chloride (>0.9% concentration), magnesium sulfate (50% or greater concentration) and concentrated medications are removed from all patient care areas, whenever possible.

B-PS.24	M	P	N	NA

Standard:
Concentrated medications not removed are segregated from other medications with additional warnings to remind staff to dilute before use.

B-PS.25	M	P	N	NA

Standard:
All medications, medication containers (e.g., syringes, medicine cups, basins), or other solutions on and off the sterile field in peri-operative and other procedural settings are labeled.

B-PS.26	M	P	N	NA

Standard:
A process is implemented to obtain and document a complete list of the patient's current medications upon admission to the organization and with the involvement of the patient.

B-PS.27		M	P	N	NA
Standard: A complete list of the patient's medications to be taken after discharge is provided to the patient.					

B-PS.28		M	P	N	NA
Standard: The discharge medication list is communicated to the next provider of service when the patient is referred or transferred outside the organization.					

(7)

DISCCUSSION

First: by brain storming & the process mapping quality tools , our research team discussed the process of the medication , how it is used , and discussed the problem of the medication errors and their types.

Second: used the cause & effect diagram (fish bone diagram) to discover the factors and causes of the problem of the medication error. It may be done by the health care professionals due to lack of therapeutic training, inadequate knowledge of drug properties, unknown patient medical condition. The doctor or nurse also could be fatigued or emotionally stressed. The error may also occur due to the similarity in shape, and name of the drug. It may be due to storing or packaging of the drug Repetitive system of ordering may cause the error. The patient himself may affect the error due to the complexity of his clinical case or due to his culture. The work environment, lack of resources, lack of the standardized protocol, work load, distraction & interruption.

Third: The research group of AL – HERAFEEN HEALTH CARE UNIT in port Fouad followed up the medication errors in clinics, emergency, pharmacy, family planning and dental clinics and noticed that the medication errors were about 60% in the pharmacy then clinics is the second-high percentage of errors. Then analyzed the errors in the pharmacy to be 60% of them are dispensing errors then transcription errors

Fourth: the implementation of the universal health insurance in all of the port said health care organizations which is started in(7-2019) and the implementation of the National Safety Requirements(NSR) especially the branch of the drug safety ,allowed the medication management safety standards to be performed in all units, centers, and hospitals in port said these standards are :

The Standard A-Ps.18: standardized protocol that manages the complete documentation of the current state of the patient, prevent any prescription abbreviations, correctly separate the high risk drugs & similar drugs in shape & name.

The Standard A-Ps.19policy to prevent errors from high risk medication that provides mitigation strategies to manage risks associated with high risk medications.

The Standard A-Ps.20: policy to prevent errors from look like medications that identifies and warn of medication similarities in names and appearance for purpose of sitting safe guards in place to reduce chance of mix ups and the potential error.

The Standard A-Ps.21: abbreviations not to be used throughout the organization to prevent miss understanding, miss communications and administration of incorrect prescription.

The Standard B-Ps.22: look alike and sound like medication are identified stored and dispensed to assure that risk is minimized.

The Standard B-Ps. 23: concentrated electrolytes ,Including, but not limited to, potassium chloride (2mg/l or greater concentration) , potassium phosphate, sodium chloride ($>$0.9% concentration), magnesium sulfate (50%or greater concentration) and concentrated medications are removed from all patient care areas, whenever possible, as accident administration of concentrated electrolytes without dilution poses a fatal threat to patients, therefore, their separation by distance is an error reduction strategy.

The Standard B-Ps. 24

Concentrated medications not removed are segregated from other medications with additional warning to remind staff to dilute before use.

The Standard B-Ps-25

All medications, medication container (e. g, syringes, medicine cups, basins) or other solutions on and off the sterile field in pre-operative and other procedure settings are labeled

The Standard B-Ps. 26

A process is implemented to obtain and document a complete list of the patient current medications upon admission to the organization and with the involvement of patient as medication reconciliation at every patient care transition effectively reduces medications, dosing error, or drug interactions. This can result from unintended medication descriptions

The Standard B-Ps.27

A complete list of the patient's medications to be taken after discharge is provided to the patient.

The Standard B-Ps.28

The discharge medication list is communicated to next provider of service when the patient is referred or transferred outside the organization

Conclusion

A standard protocol for the medication management must be performed, by continuous documentation of patient current medication, labeling of the medications and medication containers, and other solutions. prober separation of the high risk medications with frequent updating their list. proper labeling, coding & separations of the similar drugs in shape and name, prevention of any abbreviations through the organization, how to deal with the concentrated electrolytes, labeling of the medications and medication containers in the pre-operative fields, documentation of the current medication for the referred

patient outside the health care organization and for any health care service inside the organization.

The implementation of the medication management safety standards in Port Said health care organizations through the universal health insurance shows great results in the elimination of the medication errors. This term is about to be disappeared.

Recommendations

We recommend the application of the medication management safety standard in all of the Egyptian health care organizations.

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