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List of Abbreviations

Abbreviation	Full word
ASSIH	As-salam international hospital
C	Control
CI	Continues improvement methodology
CTQs	Critical to quality characteristics
DMAIC	Define, Measure, Analysis, Improve, Control
G	Measuring deviation of the variable
IM	Intramuscular
ISMP	Institute for safe medication practice
IV	Intravenous
JCI	Joint Commission Accreditation
NABH	Joint commission Accreditation Board for hospital
OR	Odds ratio
P.T	Pharmacy therapeutic committee
PRN	As needed
P-Value	Probability
QI	Quality Improvement
R	Correlation

List of Abbreviations

Abbreviation	Full word
RN	Registered nurse
RR	Relative risk
SD	Standard division
SPSS	Statistical package for social science
VOC	Voice of the customer
WHO	World Health Organization
X2	Chi-square

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Abstract

Medication administration is the basic nursing function, competent medication administration practice is more than performing the technical task of giving a pill or an injection. So Six Sigma provides an efficient mechanism for process improvement in health care. Six Sigma means a measure of quality that strives for near perfection. Six Sigma is a disciplined approach and methodology for eliminating defects in any process. ***Aim:*** This study aims to assess medication administration errors among nursing staff Assess nursing 'level of knowledge and performance regarding medication errors. Using six sigma methodologies to evaluate medication errors among nursing staff. ***Method:*** The study conducted at As-salam international hospital by using descriptive design, it was conducted at inpatient units**.** ***Sample:*** One hundred nurse and multidisciplinary team. ***Tool***: Data collection tools used in the study was structured questionnaire, observational check list and quality tools, cause and effect diagram, incident report and process map**.** ***Results:*** The study showed a highly statistically significant by using DMAIC methodology to measure the medication administration errors. , focusing on eliminating defects by reducing variation the vital few of the problem was medication administration errors (missed dose**).** ***Conclusion:*** It is apparent that the application of the Six Sigma methodology is extremely powerful in identifying, quantifying and controlling complex hospital systems. Profound organizational commitment and extensive staff training is necessary to effect and sustain lasting improvements. Project selection is key requiring projects with a clearly defined scope**.** ***Recommendation:*** Applying six sigma methodologies in different processes related to medication administration (handling, prescribing, and dispensing).

Key word: DMAIC (Define, Measure, Analysis, improve and control)

Introduction

Competition in healthcare sector is forcing healthcare for improving their processes and quality of hospital's servicers. To reduce the deficit and to move forwards perfection, Six Sigma is a method and management philosophy that attempt to improve processes and customer satisfaction to near perfection, reduce defects, reduce variation and ensure continual improvement ***(Joseph, 2011).***

Six Sigma principles and the healthcare sector very well matched because of the healthcare nature of very low or zero tolerance to mistakes and potentials for reducing medical error. However, applying Six Sigma in healthcare is not always the easiest thing to do. Some of challenges someone has to face, the initial investment in six-sigma by developing a System of training, obtaining the baseline data on process performance, the identification of processes, which can be measure in terms of defects or errors per million opportunities, the psychology of the workforce, and the extensive use of statistical language ***(Schroeder, 2013).***

Six sigma is a set of tools and technique/strategies for process improvement. It seeks to improve the quality of process output by identifying and improving the causes of

defects and minimizing variability in manufacturing and business processes ***(Tennant, 2011).*** Six sigma uses a set of quality management methods, and creates a special infra-structure of people within the organization who are experts in the six sigma methods ***(Antony, 2010).***

Six Sigma is defined as a quality improvement program with a goal of reducing the number of defects to as low as 3.4 parts per million opportunities six sigma provide an efficient mechanism to focus 0n customer requirements through improvement of operation quality. Its implementation requires careful strategic planning and strong management commitment. It is a process management system that utilizes statistical analysis to evaluate and enhance operational efficiency in order to improve product or service quality. Six Sigma is used for process improvement in health care its goal is to eliminate medical errors, meet customer/patient's needs and reduce hospital cost without affecting quality of care. Getting support from the workforce is fundamental to success ***(Joseph, 2011).***

Today many hospital administrators are offering and making training accessible and available to their employees. Classes are usually conducted within the facility, some employees even pay for training as a means to better standardize and ultimately benefit the business of

a whole. For those who have not heard this management term thrown around the office, mentioning it to the head of the department, explaining and showing them how it works may provide the entire staff with access to lessons ***(Dodge, 2014).***

Medication administration is seen as a crucial role for nurses since they are the primary healthcare providers, along with other healthcare professionals. Medication administration is an integral part of nurse' duties, consuming up to 40% of their time when nursing the patients. The role is considered a high risk procedure, as it requires high levels of concentration and skill, particularly in those which deliver critical care, which, according to published research, sustain higher rates of medication administration errors ***(Madegowda et al., 2007).***

The nurses play an essential role in medication administration, they are participants in the preparation and administration of medication through "The rights of medication administration" which are: giving the right medication in the right dose at the right time via the right route to the right patient with the right documentation, the right access to drug information, the right to have policies on safe medication administration, the right to administer medication safely and to identify problems in the system, and the right to stop, think when administering medication ***(Madegowda and Anderson, 2009).***

The accurate administration of drug depends not only on the nurses' knowledge and skills in drug dosage calculation, but also on the nurses' knowledge of pharmacology in order to examine the relevance of prescribed drugs and dosages. This serves as a useful framework for standard operating procedures. The nurse also ensures that clients are adequately prepared to administer their medication. Because up to 60% of medication errors may be committed by registered nurses ***(Madegowda and Anderson, 2009).***

Medication errors compromise patient confidence in the health-care system and increase health-care costs. The problems and sources of medication errors are multidisciplinary and multifactorial. Errors occur from lack of knowledge, substandard performance and mental lapses, or defects or failures in systems. Both experienced and inexperienced staff, including pharmacists, physicians, nurses, supportive personnel (e.g., pharmacy technicians), students, clerical staff (e.g., ward clerks), administrators, pharmaceutical manufacturers, patients and their caregivers ***(NCC Council, 2008).***

Medication administration is a routine but important part of nursing practice, which requires special skills, techniques and knowledge in order to attend to patients. Medication errors can cause serious problems in nursing

practice and expose patients to preventable threats. When a medication error occurs nurses' performance is undermined more than that of any other health care professional. Therefore, it is often the nurses who are held responsible. This may be because nurses who carry out medication orders and with this comes greater responsibility , as they are in charge of both the medications and the patients' safety ***(Maryyan and Al- Faouri, 2007).***

Significant of the Study:

AS-Salam International Hospital got its accreditation in 2010 and planned for reaccreditation, the culture of safety was launched by As-slam international hospital CEO (chief executive officer). The risk management of the hospital declared to the top management that, medication errors markedly increased and medication errors pose a serious threat to the patients. So at once effort was made to create an environment of safety, and improving productivity and efficiency that would decrease the likelihood of errors and gave everyone an opportunity to make improvements to traditional process, putting in consideration that medication errors must not take lightly and effective systems should establish with safeguards to prevent the occurrence of errors So in the interest of improving patient safety and reduce medication errors the hospital leadership committed to the development an

approach to approved a project using Six Sigma to determine what changes in policy and practices might be necessary to significantly reduce these errors.

In Egypt, there is prospective observational study included 10.000 women who presented at the obstetric emergency ward, all medication prescribed in the obstetric emergency ward were monitored for different types of errors. It indicated that ،total of 1976 medication errors were detected as administration errors ***(Department of Obstetrics and Gynecology report at Menofyia hospital, 2010).***

The institute of medicine 2006 reported that. Medication errors are the most common errors harming at least 1.5 million people every year in Egypt, there is no statistically data regarding the incident of medications errors, but some Studies were carried out in Egypt ***(El Maged, 2002)*** on 200 nurses in Asyut university hospital reported that, medical intensive care units had 14.0% of errors in medication administration phase.

Aim of the Study

This study is aiming to assess medication errors among nursing staff through:

1. Assess nursing 'level of knowledge and performance regarding medication errors.

2. Using six sigma methodology to evaluate medication errors among nursing staff.

Research questions:

Did six sigma methodology is effective in measuring medication administration errors among nursing staff?

Operational Definitions:

Six sigma model: DMAIC (Define, Measure, Analyze, Improve and Control) ***(JCI 5th edition April, 2014)***

Prescribing errors: illegible prescriptions or medication orders that lead to errors that reach the patient ***(JCI 5th edition April, 2014).***

Dispensing errors: pharmacist transcribe and check the prescriptions written by the Prescribing health professionals incorrectly and will then pick the medication and document the process that lead to medication errors ***(JCI 5th edition April, 2014).***