Quality improvement Project: Minimizing Errors in Preparing and Administering Oral Medications via Feeding Tubes.

Ahmad Zeb[1]. Sayyeda Aisha Bahar[2], Muhammad Sohail[3], Muhammad Noman Khalil[4], Waleed Asif Khursheed[5], Iftikhar Alam[6]

1. House Officer (intern) Ayub Teaching Hospital Abbottabad,kpk, Pakistan
2. Female Medical Officer DHQ hospital Mishti Mela Orakzai,kpk, Pakistan.
3. Emergency Medical Officer DHQ chakwal
4. House Officer (intern) Ayub Teaching Hospital Abbottabad,kpk, Pakistan
5. Medical officer at armed Force Institute Of Urology Rawalpindi,Kpk,Pakistan.
6. PGR General Medicine Benazir Bhutto Shaheed Hospital ATD, kpk Pakistan.

Corresponding Author: Sayyeda Aisha Bahar

Email: Ayeshagul794@Gmail.Com

Date Received: Nov-15-2023
Date Accepted: Dec-21-2023

ABSTRACT

Background: Complications arising from medication practices involving patient with NGT, include: blockages of the tubes, chemical incompatibility and medication administration inconsistencies. Such mistakes can result in severe AEs, and thus, improved preparation and administration process should be made to avoid jeopardizing patients' lives.

Objectives: To decrease medication-related errors especially in the administration of oral medicines through NGT in adult clientele through a quality improvement project.

Study Design: A observational study

Place of duration of study. General Medicine Unit B at Ayub Teaching Hospital in Pakistan from jan 2023 to july 2023

Methods : This is an observational study that was done in two phases in the General Medicine Unit B at Ayub Teaching Hospital in Pakistan Utilizing the PDSA model, planning, doing, studying and acting components were used to form the best practices guidelines. It was also ensured that all the staff members underwent training in terms of the correct NGT medication administration, and the list of medications that are not to be crushed.

Results : It was cross-sectional in nature with the intervention implemented on 100 medication doses and the second on another 100 medication doses. Mean age was 67 /- 4. 2 years. The t-test calculated for reduction of medication error was significant for which the p-value 0. 01 was obtained after running the quality improvement program. The rate of crushed enteric-coated tablets reduced from seventy–eight percent to thirty – percent, while the rate of adherent tube flushing practices increased. Also, the rate of tube obstructions were brought down from 40 percent to 17 percent per week.

Conclusion:: The quality improvement intervention successfully reduce errors with oral medications via NGT in adult patients. Applying a strict training program as well as formal procedures helped in increasing safety measures regarding medications and consequently making lower the number of complications arising from medications; this indicated the importance of collectivism in the delivery of patient services.

Keywords : NGT, Medication Errors- A Study in Quality Improvement and Patient Safety

Citations
Ahmad Zeb, Sayyeda Aisha Bahar, Muhammad Sohail,Muhammad Noman ,Waleed Asif & Iftikhar Alam. Quality improvement Project: Minimizing Errors in Preparing and Administering Oral Medications via Feeding Tubes. Journal of Bacha Khan Medical College, 4(02), 22–26.
https://doi.org/10.69830/jbkmc.v4i02.86

Introduction

Patients on oral medicines especially in hospitals require nasogastric tubes (NGT) due to inability to swallow, nevertheless it has specific dangers of medication error 7, tube blockage and adverse pharmaceutical reactions (1, 2). Misconceptions can result from inadequate preparation for example breaking enteric-coated or modified-release tablets, or wrong method of administering the medications for instance; use of cups to mix several drugs (3, 4). These mistakes can develop into more severe problems that entail blockage of tubes and suboptimal pharmacologic effects, respectively (5, 6). Prior Study has established that CUSP implemented through structured quality improvement models decrease these errors through changes to staff education and policy (7, 8). Thus, this study sought to enter a quality improvement project based on PDSA test which focus on the reduction of error in the preparation and administration of oral medication through NGT in adult patients.

Methods

This observational study was conducted at Ayub Teaching Hospital's General Medicine Unit B. The study was divided into two phases: namely the pre-intervention phase (Phase I) and the post intervention phase (Phase II). In phase I measurements of medication preparation and administration errors were taken before the implementation of the CPOE system. To begin with, in phase II, a quality improvements program were initiated with best practices. Training of all health care personnel and distribution of guidelines on correct procedures of administration of medications through NGT was done.

BeforetheQI project;

Between 20th july2024 and 3rd august 2024, we carried out study to examine practices related to the preparation and administration of oral medications via NGT by attendants. We determined the proportion of incorrect techniques used in medication preparation and administration. During this period, we observed 100 doses of medications being prepared and administered by patient's attendants to 15 patients. Patients' attendants had limited understanding of controlled-release and enteric-coated dosage forms, as well as the risks associated with mixing solid medications in the same crushing container during preparation. To examine practices related to medication preparation and administration through NGT, and to determine the rates of incorrect preparation and administration, data were collected from July 20, 2024, to August 3, 2024, at the Medical B Unit of Ayub Teaching Hospital (phase I—baseline measurement). The following results were obtained:

Medication Preparation

Failure to wash hands before medication preparation: unfortunately, 65% of the attendants did not wear gloves while handling medication and 65% also did not wash their hands before handling the medications. crushing of enteric-coated tablets: examples that were noted in the study include the finding that 78% of attendants did not crush enteric-coated tablets as they were supposed to be crushed in the intestines not in the stomach hence may lead to drug ineffectiveness or toxicity. mixing of drugs during medication preparation: regarding the preparation of the dosage forms, 66% of the attendants compounded several drugs together to one dose whichphysicallyalter efficacy, sideeffects, or compatibility.

Medication Administration

No hand washing prior to medication administration: Consistent with preparation practices, 65% of this attender did not wash their hands before administering medications thus increasing an infection risk. Lack of tube flushing before administering medication: A number of Studyers pointed out that 57% of the attendants did not rinse the feeding tube prior to giving medications, thus there are high chances of tube blockage and wrong delivery of drugs. Administering medications simultaneously: Regarding the prescription of multiple medications, 76% of the attendants went ahead and prescribed simultaneously without proper spacing which increases the likelihood of having drug-drug interactions that may cause harm to the patients. No tube flushing between administering different medications: A failure to operate this procedure correctly was also observed in 68% of attendants as many failed to flush the tube between administering different medications thus increasing the risk of cross contamination and blockage of the tube. Administering medication that interacts with or adsorbs to enteral nutrition without observing the recommended minimum interval: At that 52% of attendants did not follow time intervals when giving medications that could interfere with enteral nutrition therefore decreasing drug effectiveness.

Ethics

Both the patients and their attendants were fully informed about the aim and method of the study that was to be conducted. They had to also sign consent forms that were

consent form or agreement which made them understand the study's process. The participants were also told that even though the data collected would remain anonymous it may be used for publication purposes. Participants' identities and their information were kept confidential and anonymous to follow theethical Studypractices.

Data Collection

Pre-intervention data were obtained through direct observation of 100 medication doses While post-intervention data were also gathered through direct observation of 100 medication doses. Adverse events involved such aspects as technique of medication preparation and techniques of medication administration were observed and errors noted. Further information was obtained by a survey which covered the main difficulties and gaps in knowledge revealed by the staff during the interview.

Statistical Analysis

Statistical analysis was done using a statistical tool the SPSS Version 20. 0. While data collected at baseline and follow-up were described using descriptive statistics. To make a comparison of the frequency of medication errors with the pre-intervention and the post-intervention, an activity called 'chi-square test' was performed. STATISTICAL ANALYSIS • The level of significance used was 0. 05 signifying the success of quality improvement program.

Results

The mean age for the patients was 67 years with an SD of 4. 2 years. After the quality improvement intervention, the number of patients that experienced incorrect medication preparation dropped sharply from a 70% level in phase I to 20% in phase II ($p < 0.01$). Proper techniques of tube flushing rose from 43% to 70% while the incidences of tube blockages declined from 40% to 17%. Thus, the effectiveness of the strategies that were put into practice can therefore be concluded as having drastically cut down medication errors and resultant patient harm.

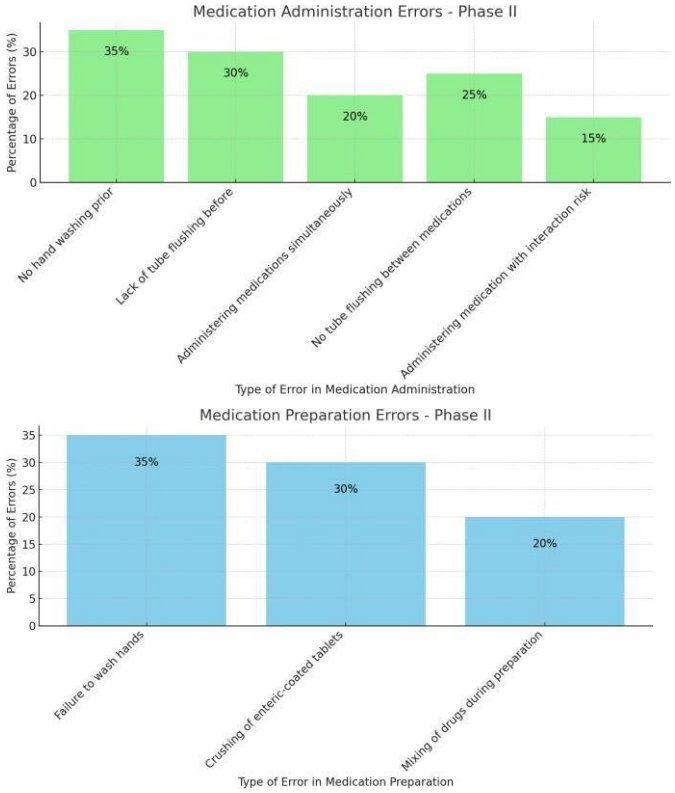

Table 01: Medication Preparation Errors

Medication Preparation Errors	Phase I (%)	Phase II (%)
Failure to wash hands	65	35
Crushing of enteric-coated tablets	78	30
Mixing of drugs during preparation	66	20

Table 02: Medication Administration Errors

Medication Administration Errors	**Phase I (%)**	**Phase II (%)**
No hand washing prior	65	35
Lack of tube flushing before	57	30
Administering medications simultaneously	76	20
No tube flushing between medications	68	25

Table 03 :Summary of Outcome Measures

Outcome Measure	Phase I (%)	Phase II (%)
Hand washing before preparation	35	65
Crushing enteric-coated tablets	78	30
Flushing tube before medication	43	70
Flushing tube between medications	32	75
Tube obstructions	40	17

Discussion

In line with the Studyes done before, this quality improvement project also revealed that proper medication management is highly valuable for patients with nasogastric tubes (NGT). Studies have shown that misadventures that involves medications through the use of NGT can be disastrous as it results in tube blockages, poor efficacy of the medicine and incidence of adverse effects (9, 10). For instance, Tissot et al. (1999) observed that the majority of medication errors in intensive care unit involved the administration phase, thus the mounting call for special measures to improve safety (11). Allover, Grissinger (2013) cogently pointed out that the inadequate preparation and administration of medications through enteral feeding tubes may lead to therapy failure s and enhanced patient morbidity (12). This implies that what was being trained and observed is the implementation of best practices regarding the aspects of the manufacturing process that was found to have errors; reduction of errors such as crushing of enteric coated tablets and poor hand hygiene is found to support Feinberg et al. 's (2017) argument as well as other Study (13). These enhancements help to apply the PDSA cycle for the continuous quality improvement with less errors in clinical practice as proposed by the Institute for Healthcare Improvement (14).

Conclusion

The improvement project positively impacted the reduction of error in preparing and administering of oral medicines through NGT through provision of standard training and practice measures. This decrease in medication errors and complications proves that patients are safer and clinicians have Made practice improvements with a team approach.

Limitations

The fact that the study was conducted with observers who were present at the hospitals may have changed attendants' behavior thus under estimating error rates in real settings. On the same note, this study focused on one hospital unit, and therefore the results we got cannot be easily transferred to other settings or to other clients.

Future Directions

Future Study ought to consider the long-term outcomes of these enhancements alongside evaluating the efficiency of like interventions in other areas of the hospital and in patients of distinct genders. Subsequent studies have to be conducted to define and evaluate other large-scope education interventions that use technology and simulation as learning tools to improve medication administration.

References

1. van Riet-Nales DA, Schobben AFAM, Vromans H, et al. Safe and effective pharmacotherapy in infants and preschool children: importance of formulation aspects. *Archives of Disease in Childhood*. 2016;101(7):662–9. doi:10.1136/archdischild-2015-308227.
2. Romero Jiménez Rosa Mª, Ortega Navarro C, Cuerda Compés C. Polypharmacy and enteral nutrition in patients with complex chronic diseases. *Nutrición Hospitalaria*. 2017;34(1):57–76. doi:10.20960/nh.1240.
3. Hens B, Corsetti M, Bermejo M, et al. "Development of Fixed Dose Combination Products" Workshop Report: Considerations of Gastrointestinal Physiology and Overall Development Strategy. *AAPS Journal*. 2019;21(5):75. doi:10.1208/s12248-019-0346-6.
4. Feinberg J, Nielsen EE, Korang SK, et al. Nutrition support in hospitalized adults at nutritional risk. *Cochrane Database of Systematic Reviews*. 2017;5. doi:10.1002/14651858.CD011598.pub2.
5. Institute for Healthcare Improvement (IHI). How to improve. Cambridge, MA: Institute for Healthcare Improvement; 2016.
6. Grissinger M. Preventing errors when drugs are given via enteral feeding tubes.

Pharmacy and Therapeutics. 2013;38(10):575–6.
7. Tissot E, Corvette C, Demoly P, et al. Medication errors at the administration stage in an intensive care unit. *Intensive Care Medicine*. 1999;25(4):353–9. doi:10.1007/s001340050857.
8. Dart RC, Bronstein AC, Spyker DA, et al. Poisoning in the United States: 2012 Emergency Medicine Report of the National Poison Data System. *Clinical Toxicology*. 2012;51(10):949-1149. doi:10.3109/15563650.2013.840755.
9. Allan EL, Barker KN. Fundamentals of medication error Study. *American Journal of Hospital Pharmacy*. 1990;47(3):555–71.
10. Vassallo P, Trotta F, Mazzaglia G, et al. Statins and risk of cataract: A nested case-control study within a healthcare database in Italy. *Drug Safety*. 2014;37(2):99-104. doi:10.1007/s40264-013-0114-6.
11. Tissot E, Cornette C, Limat S, et al. Observational study of potential risk factors of medication administration errors. *Pharmacy World & Science*. 2003;25(6):264–8. doi:10.1023/B.0000006541.13868.96.
12. Grissinger M. The Five Rights: A Destination Without a Map. *Pharmacy and Therapeutics*. 2010;35(10):542-543.
13. Feinberg J, Longhurst CA, Grossman D, et al. Risks of high-dose statin therapy. *Journal of the American College of Cardiology*. 2017;69(8):917-918. doi:10.1016/j.jacc.2016.12.032.
14. Reason J. Human error: models and management. *BMJ*. 2000;320(7237):768-770. doi:10.1136/bmj.320.7237.768.

Disclaimer: Nil
Conflict of Interest: There is no conflict of interest.
Funding Disclosure: Nil

Authors Contribution
Concept & Design of Study: Ahmad Zeb1. Sayyeda Aisha Bahar2

Drafting: Muhammad Sohail3 Waleed Asif Khursheed[5],M Noman khalil[4], Iftikhar Alam[6]

Data Analysis: Muhammad Sohail3,Waleed Asif khurshid[5],

Critical Review: Sayyeda Aisha Bahar2

Final Approval of version: Ahmad Zeb1

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit-http://creativecommons.org/licenes/by/4.0/.© The Author(s) 2023