

Original

## Drug administration through feeding tubes; an integrated qualification program

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### Abstract

**Introduction:** The literature documents numerous inconveniences of drug administration through feeding tubes. Actions to improve the quality of this practice are of great importance.

**Objective:** The objective of this study is to describe the implementation process and results of an Integrated Program to improve drug administration through feeding tubes in a Brazilian general hospital.

**Methods:** This is a descriptive study of a clinic quality improvement program which proceeded in four steps: (1) design of a data base with technical characteristics of oral drugs; (2) application of an identification label on non-crushable tablets; (3) evaluation, through focal groups, of nursing technicians' knowledge of drug administration through feeding tubes, and formal training; (4) prescription review of patients prescribed enteral nutrition and subsequent pharmaceutical intervention.

**Results:** A list with 131 oral drugs used within the hospital was compiled with recommendations for their administration through feeding tubes. Seven non-crushable drugs were identified with "do not crush" labels. Formal training regarding drug administration through feeding tubes was elaborated incorporating findings from the focal groups and applied to the nursing team. Over eight months, we analyzed 888 prescriptions written for 185 patients and addressed 263 pharmaceutical interventions to the medical team (which they accepted in 100% of the cases), and 105 interventions to the nursing team.

**Conclusions:** Qualification programs with multiple strategies, as the one described here, may directly improve drug administration through feeding tubes and help to solve and prevent problems related to this practice.

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Key words: Drug. Enteral nutrition. Feeding tube. Hospital.

### ADMINISTRACIÓN DE FÁRMACOS A TRAVÉS DE LAS SONDAS DE ALIMENTACIÓN: UN PROGRAMA INTEGRADO DE CUALIFICACIÓN

#### Resumen

**Introducción:** En la bibliografía se documentan muchos inconvenientes de la administración de fármacos a través de las sondas de alimentación. Las acciones para mejorar la calidad de esta práctica son de gran importancia.

**Objetivo:** El propósito de este estudio es describir el proceso de implantación de un Programa Integrado para mejorar la administración de fármacos a través de las sondas de alimentación y sus resultados en un hospital general de Brasil.

**Métodos:** Este es un estudio descriptivo de un programa de mejora de la calidad clínica que consta de cuatro pasos: (1) diseño de la base de datos con las características técnicas de los fármacos orales; (2) aplicación de una etiqueta de identificación de las tabletas no machacables; (3) evaluación, a través de grupos focales, del conocimiento de los técnicos de enfermería sobre la administración de fármacos a través de sondas de alimentación, y entrenamiento formal; (4) revisión de la prescripción de los pacientes con nutrición enteral y la intervención farmacéutica subsiguiente.

**Resultados:** Se compiló una lista de 131 fármacos orales empleados en el hospital con las recomendaciones de su administración a través de las sondas de alimentación. Se identificaron siete fármacos no machacables con las etiquetas de "no machacar". Se elaboró el entrenamiento formal relativo a la administración de fármacos a través de las sondas de alimentación incorporando los hallazgos de los grupos focales y que fueron aceptadas en el 100% de los casos) y 105 intervenciones al equipo enfermero.

**Conclusiones:** Los programas de cualificación con estrategias múltiples, como el descrito aquí, pueden mejorar directamente la administración de fármacos a través de las sondas de alimentación y ayudar a resolver y evitar los problemas relacionados con esta práctica.

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Palabras clave: Fármaco. Nutrición enteral. Sonda de alimentación. Hospital.

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## Introduction

Enteral nutrition therapy is a strategy employed for the prevention and treatment of nutrition disturbances in patients who cannot or will not take food or medication by mouth, but have a functional gastrointestinal tract.<sup>1,2,3,4,5</sup> Enteral nutrition, especially when compared to parenteral nutrition, is more closely related to a natural physiologic feeding process; it can reduce morbidity and other disadvantages associated with parenteral administration.<sup>3,4,6,7</sup> Patients on enteral nutrition also tend to present with multiple diagnoses that lead to the use of multiple drugs, turning the feeding tube into an important administration route for medication.<sup>3,4,6</sup>

Authors from many different fields have documented inconveniences related to drug bioavailability, effectiveness, safety and others when drugs are administered through feeding tubes.<sup>2,4,6,8,9,10</sup>

Pharmacotherapy problems are often associated with physicochemical incompatibilities, drug-nutrient interactions, or use of the incorrect feeding tube administration techniques.<sup>4,6,8,11,12</sup> Thus, some drug interactions can have important impact on the patients' clinical state<sup>4,13</sup> and some dosage forms, such as controlled release tablets, enteric coated tablets, and tablets containing cytotoxic drugs, can't be crushed.<sup>2,3,7,14,15</sup>

Taking action to improve the quality of drug administration to patients with enteral feeding tubes is critical. However, few studies describe implementation of programs with that goal, especially integrated programs comprising different measures.<sup>9,10,16</sup>

The objective of this study is to describe the implementation process and results of an integrated program to improve drug administration through feeding tubes in a Brazilian general teaching hospital.

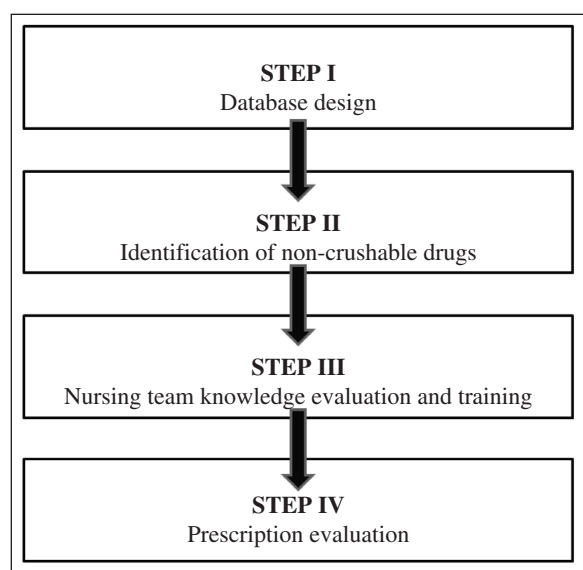


Fig. 1.—Steps of the integrated program to improve drug administration.

## Methods

A descriptive study carried out on a Brazilian general teaching hospital located at Minas Gerais state, with 350 hospital beds. The study was carried out from July 2007 to December 2008, after being approved by hospital's institutional ethics committee.

The hospital pharmacy distributes drugs in properly identified unit dose packaging.

In the institution, enteral nutrition is always given continuously through size 12 French feeding tubes, and most of the time, with an infusion pump.

Before implementation of the qualification program, nursing technicians were trained by nurses about general care of feeding tubes and drug administration without a formal program or training documentation.

The integrated program to improve drug administration through feeding tubes consisted of four steps, described below (fig. 1).

### *Step I: design of a data base with technical characteristics of oral drugs*

Pharmacists compiled a list with all drugs for oral use available at the hospital; it described dosage form, alternative dosage forms as an exchange option (available at the institution and on the market), and general recommendations (preparation and administration technique, preferred dosage form for administration through feeding tubes, potential drug-enteral nutrition interaction and others).

For the compilation, pharmacists completed a non-systematic review of the scientific literature concerning drug administration through feeding tubes and also consulted manufacturers and Brazilian regulatory agency (*Agência Nacional de Vigilância Sanitária*) database to augment the list with appropriate information.

More details about the methodology used for list compilation are described on Nascimento & Ribeiro (2011).<sup>17</sup>

### *Step II: Identification of non-crushable drugs*

Pharmacy staff labeled all drugs and capsules incompatible with preparation techniques necessary for enteral administration with a bold design and the following saying: "Do not crush."

### *Step III: Nursing team knowledge evaluation and training*

Focal groups —groups of people who were familiar with the enteral nutrition processes at the hospital— were convened in order to evaluate the nursing team's (nursing technicians and nurses) knowledge about drug administration through feeding tubes. Each focal group

section followed a pre-established script. Participants discussed common problems, and their answers and were recorded with the participants' consent.

The recordings were transcribed and analyzed by pharmacists in order to identify focal points and the overall process of drug administration through feeding tubes in the hospital. Having this analysis in consideration, a training program was elaborated and applied to the nursing team.

#### Step IV: Prescription evaluation

From April to November, 2008, a pharmacist reviewed all prescriptions for adult hospitalized patients occupying 50 general clinic beds and receiving enteral nutrition.

Pharmacists evaluated the information collected with the aid of the list compiled on "Step I" and if necessary they would effect an intervention directed at physicians or nursing technicians. They informed physicians about potential drug-enteral nutrition interactions, prescription of inappropriate dosage forms and potential physicochemical incompatibilities, and informed nursing staff about prescription of drugs with special or unusual preparation methods.

Pharmacists intervened only after evaluating the intervention's pertinence, clinical and laboratorial parameters, and clinic and drug therapy history available on the patients charts. For instance, if warfarin was prescribed, an intervention regarding interaction with enteral nutrition was made only if the INR goals were not achieved.

The data collected through prescription evaluation were organized and analyzed on the Epi Info®, a software developed by CDC (Centers for Disease Control and Prevention) used to create and process databases.

### Results

A list with 130 drugs used in the hospital was compiled. It included eight medications (6.1%) that should-

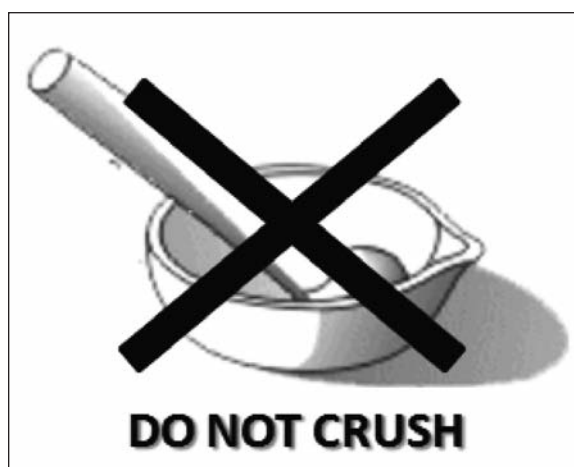


Fig. 2.—“Do not crush” label.

n't be crushed, and 62 (47.3%) involved potential drug-enteral nutrition.

Non-crushable drugs were listed and presented to the hospital medical team on posters placed in close proximity to the computers used by physicians for prescribing. The posters also contained the reason why the drugs should not be crushed and options to use as alternatives. The list was also presented to physicians by pharmacists during training meetings assembled for this purpose. Physicians accepted the initiative well.

Pharmacy staff also identified non-crushable drugs before dispensing them to the hospital ward with a “Do not crush” label fixed on their unit dose packaging (fig. 2).

The analysis of the focal group transcriptions made it possible to identify focal points that guided the elaboration of the nursing team training program (fig. 3). To ensure the application of the correct technique for drug preparation and administration through feeding tubes, pharmacy staff posted posters with step-by-step directions in ward medication rooms.

We evaluated 888 prescriptions written for 185 patients. We sent 263 interventions to physicians, and 105 to the nursing technicians. In other words, for every three prescription evaluated, one intervention

Focal Point	Training approach
Drug administration is seen as a priority for patient care, and nursing technicians requested more information regarding this practice.	Basic notions on pharmacology and pharmacokinetics.
Lack of knowledge about different drug dosage forms.	Theoretical-practical presentation about different dosage forms.
Lack of routine pattern of drug administration through feeding tubes.	Correct general technique for drug administration through feeding tubes.
Difficulties on the administration of specific drugs through the feeding tube, like omeprazole (capsule) and ferrous sulfate (coated tablet).	Presentation of the institutions' non-crushable drugs list and orientations on how to proceed when one of these drugs is prescribed to be administered though the feeding tube.

Fig. 3.—Focal points identified during focal groups and training approach inspired by them.

was directed to the medical team, and, for every eight prescription evaluated, one intervention was directed to the nursing team.

During the prescription evaluation step, 871 potential interventions were identified. However, after having their clinical pertinence studied, only 263 interventions (30.2%) were directed to the medical team using person-to-person contact and documentation in medical charts.

From interventions directed to the medical team, 190 (72.2%) addressed potential drug-enteral nutrition interaction, 71 (27%) non-crushable drugs or more appropriate dosage form alternatives, and 2 (0.8%) potential gastrointestinal disturbances. The medical team accepted all interventions.

## Discussion

The development of the Integrated Program to improve drug administration through feeding tubes, with multiple strategies and multidisciplinary approach, described on this study is innovative and contributes to the results of the investigation. The literature presents data of different studies that used one or some techniques described on the present study,<sup>9,10,16,18</sup> however, none of them applied such number of different strategies to improve the pharmacotherapy of patients under enteral nutrition or demonstrated results regarding such large number of individuals.

Our first step—development of a single consultation source—laid the groundwork for the next steps and offered the healthcare team updated information regarding drug administration through feeding tubes, contributing to physicians' and nurses' professional education.

Preparing and presenting the non-crushable drugs list to the medical team alone was ineffective at modifying physician prescribing practices; they continued prescribing non-crushable dosage forms for patient who had enteral tubes. It is possible this occurred because physicians frequently lack knowledge about specific dosage forms and their influence on the therapy's safety and effectiveness. Once pharmacists began to contact them about these issues, their prescribing practices changed.

However, identification of non-crushable drugs with labels prompted the nursing team to make contact with the medical team or pharmacists, adding another point in the continuum of medication administration that might increase safety.

The training and the posters were well received by the nursing team and created an opportunity for them to contact and develop a better professional relationship with the pharmacists. Ultimately, this improved nursing acceptance of the interventions performed on the prescription evaluation step.

Use of the focal groups' feedback made it possible to identify critical points and tailor educational interven-

tions, which, according to Rakowski (1999), must respond to the individuality of each group and its behavior patterns.<sup>19</sup> Because of the focal groups, we were able to develop a training program that raised the attention and interest level, but didn't cover topics already well understood among the nursing professionals.

The results of the prescription evaluation step draws attention to the high percentage of interventions regarding drug-enteral nutrition interactions, which physicians may not normally consider during the prescription process or clinical evaluation.

As prescription review by pharmacists becomes a routine part of their daily duties, further effective action will probably include the implementation of multidisciplinary rounds including a clinic pharmacist. This will allow open, direct discussion about drug therapy in more appropriate moments, transcending the limits of chart documentation.

As with all good interventions, interventions for patients who have enteral tubes could not be made without regard to each patient's unique clinical history. This professional responsibility uses the pharmacist's basic knowledge and education, applying it to the patient's unique situation. Having that in mind, the interventions were only made after the evaluation of their clinical relevance (30,2% of the potential interventions total).

Chart documentation by pharmacists made multidisciplinary interaction possible, once it drew other healthcare professionals' attention to the relation between their regular routines and drug administration' feeding tubes practices. In this sense, the program also provided educational and practical measures regarding: (1) evaluation of the possibility of liquid dosage forms administration during testing to evaluate patient swallowing ability; (2) evaluation of nutritional goals after the possible development of drug-nutrient interaction; (3) orientation about stasis of enteral nutrition on feeding tubes caused by drug-enteral nutrition incompatibility addressed to nurses. This facts show the importance of a multidisciplinary approach on the healthcare process and the relevance of the pharmacist role on this scenario.

The non-quantification of the acceptance of the interventions among the nursing professionals was a limitation of the present study. In practice, it wasn't possible to follow up the daily routine of drug preparation and administration. Another limitation lies on the fact that prescription evaluation was restricted to the time when the pharmacist in charge of this routine was present at the hospital, since there wasn't a replacement during his absence.

## Conclusion

Drug administration through feeding tubes is a complex process and demands a multidisciplinary approach, with the participations of nurses, pharmacists, phonoaudiologists, nutritionists and doctors.

To ensure appropriate therapeutic results, more emphasis on patients receiving drugs and enteral nutrition is necessary.

The development and implementation of an integrated program with multiple strategies, as the one described on this study, is an effective way to improve the drug administration through feeding tubes process, prevent and solve problems caused by this practice.

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