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Strategies to improve medication safety in patients with feeding tubes

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In hospitalized patients, one third of adverse drug events are caused by incorrect drug administration. Particularly complex and thus error-prone is drug treatment in patients with feeding tubes. Approximately 10% of all inpatients receive medication through feeding tubes. This figure may even rise up to 34% in intensive care units (ICU), where patients with feeding tubes receive an average of five to six medications each day through this route of administration. In these patients, inappropriate drug prescription and administration may result in dose dumping, non-response, or tube obstructions, especially if solid dosage forms must be crushed and/ or suspended. However, not only patients are at risk in consequence of incorrect drug treatment, also the preparing person can be harmed while inadequately preparing hazardous drugs.

Due to the increasing number of patients with feeding tubes, it becomes more and more important to evaluate and improve drug treatment for tube patients. Intervention programs can effectively improve drug treatment, however, earlier programs focused on the drug administration process and were tailored to institutions using unit-dose-systems or electronic patient records presuming personal assistance on the participating hospital wards.

In order to improve patient safety for tube patients in a hospital without computerized physician order entry (CPOE) system or electronic patient record, this work aimed at evaluating the process of drug treatment in patients with feeding tubes. As a consequence, this work assessed available information sources on drug modification utilized on the hospital wards, developed an intervention program in order to improve the drug administration process, and, finally, evaluated an algorithm to facilitate drug prescription. Both, the intervention program and the algorithm were designed to work in a hospital without CPOE or electronic patient records.

This work highlighted that information sources on drug modification were often outdated, flawed, or inappropriate for the personnel or technical circumstances on a ward. Inappropriate information on crushing and suspending was found on each list and concerned in particular solid drugs with modified-release formulation and capsules. Additionally, the age of the respective list correlated with the number of brands withdrawn from the market.

In order to avoid the use of such inadequate information detached from a quality management system on the hospital wards, the second project evaluated a multifactorial intervention program consisting of the provision of an electronic database with information on crushing and suspending solid dosage forms, an e-learning tool, printed lists with information on drug modification of the top 25 brands used on the respective ward, and a personal teaching. As a result, the implementation reduced drug preparation errors including inappropriate drug modification, missing safety precautions, the use of inappropriate solvents, or a combination of these preparation errors by about 45% on the ICU and by more than 80% on the surgical ward for oral, dental, and maxillofacial diseases (surgical ward). Especially incorrect crushing and suspending of hazardous brands comprising CMR drugs, modified-release drugs, antivirals, and bisphosphonates was reduced from 32% to 15% on the ICU and from 36% to 5% on the surgical ward.

Nevertheless, although the intervention program reduced drug administration errors and to a lesser extent also inappropriate prescriptions, administration errors still occurred during the intervention period. Since these errors were mostly caused by the physicians who prescribed unsuitable brands for tube administration, the last project aimed at developing and evaluating an algorithm to facilitate drug prescription in patients with feeding tubes. Whereas the physicians' manual drug switching were completely correct only in 59% of the performed drug switching processes, the developed algorithm switched 90% of the evaluated brands to a brand suitable for tube administration. Here, drug switching considered the entire German drug market with the consequence that 6% of the switched brands had to be ordered outside the hospital pharmacy because these brands were not listed on the hospital drug formulary. The developed algorithm should be integrated ideally in the already existing clinical decision support system switching drugs at the interface between primary and tertiary care, because many prescribing errors occur at hospital admissions. Furthermore, this tool could be utilized in patients temporarily receiving a feeding tube during their inpatients' stays.

In summary, the implementation of the developed algorithm in clinical practice in combination with the multifactorial intervention program focusing on drug administration may improve quality of drug treatment in patients with feeding tubes with the consequence of less serious medication errors in these patients.