



EVALUATION OF MEDICATION ERRORS IN PHYSICIANS ORDER vs NON PHYSICIANS ORDER ENTRY SYSTEMS

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1. BACKGROUND

Antineoplastic drug therapy errors represent a high iatrogenic potential, due to antineoplastic drugs narrow therapeutic ranges and chemotherapy regimens complexity, that may increase the oncologic patient morbimortality. So, antineoplastic drugs are commonly involved in drug adverse events, in fact 21% of fatal drug adverse events and 23% of drug induced permanent disabilities are due to antineoplastic. Medication errors are preventable and mainly due to system failures rather than human mistakes, so there is an opportunity to improve the system by detecting and correcting system failures.

Different Health Care organizations have developed recommendations in order to reduce the potential for medication-related errors (ME) in antineoplastic regimens which include: educating health care providers establishing dosage limits, verifying antineoplastic doses, standardizing the prescription vocabulary, improving collaboration and communication among the interdisciplinary team (physicians, pharmacists and nurses) and standardizing chemotherapy protocols.

Computerization of prescription, preparation and administration can implement all these recommendations in an efficient way and prevent ME at all stages of the drug use process.

Oncofarm™ is a software application developed with a multidisciplinary approach with computerized Physician Order Entry, automated dosage calculation and real-time alerts. The program provides printed formulation worksheets and administration forms with explicit instructions. Access to all program files is password protected.

2. OBJECTIVE

To compare ME rate using a computer application (Oncofarm™) designed for the comprehensive management of oncologic therapy with an interactive Physician Order Entry (POE) in cancer patients with a traditional Unit Dose Distribution System software (Farmasyst™) with non-Physician Order Entry (n-POE) in internal and surgical patients.

3. METHODS

Study:

Prospective cohort study during ten months (January-October 2001) for oncologic patients and two months (April-May) for non oncologic patients: neurology, gastroenterology, cardiology, nephrology and urology.

Data collecting:

All medication errors intercepted during pharmacists prescription, transcription (hand written prescriptions for non-oncologic patients) and preparation validation were corrected and documented (figure). Besides, in oncologic patients a non-punitive self-reporting system was implemented, and medication errors identified and documented by physicians and nurses were also collected.

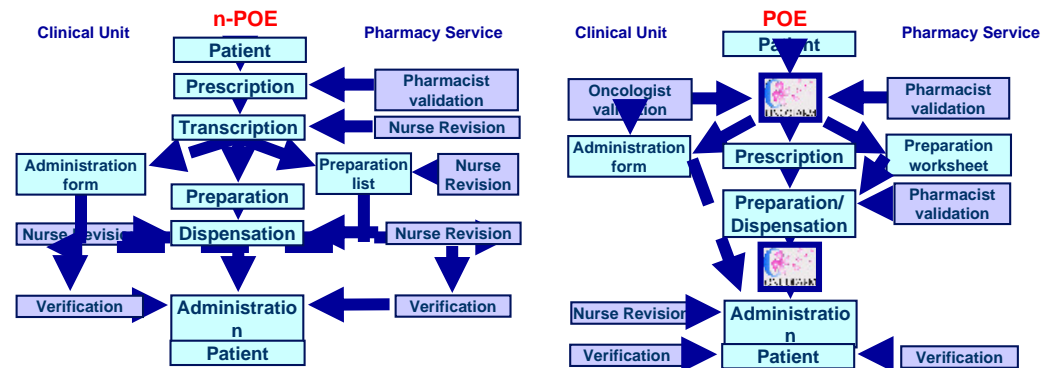
Variables analyzed:

Type of prescription (POE or n-POE), stages of drug use process where the ME was identified. For oncologic patients ME drug involved (antineoplastic or supportive treatment), as well as whether ME reach or not the patient and potential clinical outcome were also recorded. Periodically ME documented are reviewed by the multidisciplinary team to identify system failures than can be corrected.

Statistical analysis:

Drug use process ME rate (ME per 1000 patients-day) were calculated with their 95% CI, Pearson χ^2 Test was used to compare interactive POE versus n-POE ME rates.

Potential Sources of ME and correction/prevention mechanism



4. RESULTS

In oncologic patients 84 ME were identified and prevented from 5596 patient-day and from a total of 12331

preparations. In non-oncologic patients 328 ME were detected from 1316 patient-day and 16781 preparation. Table 1 shows ME rate at each drug use stage identified and prevented with the methodology established.

STAGE OF ERROR	INTERACTIVE ^{a1}	MANUAL ^{a2}	ODDS RATIO	SIGNIFICANCE (p)
PRESCRIPTION	5.0 (3.3-7.2)	12.2 (7.0-19.7)	2.5	<0.05
TRANSCRIPTION ^b	-	12.9 (7.5-19.6)	-	-
PREPARATION	8.8 (6.5-11.6)	37.2 (27.7-49.9)	4.4	<0.0001
ADMINISTRATION	1.3 (0.5-2.6)	Not recorded	-	-

a1: Application used: Oncofarm™; a2: Application used: Farmasyst™; b: In cancer-patients this process is obviated

Prescription ME Odds Ratio (OR) is 2.5 greater with n-POE than with POE. This OR increases until 4.4 in the preparation progress.

The number of prescription ME that reach oncologic patients with POE (4 antineoplastic ME/ 8 supportive treatment ME) are significantly lower, 0.2% (95%CI: 0.1-0.4%), than those ME that are prevented and don't reach patients, 0.5% (95% CI: 0.3%-0.7%). None of these errors resulted in clinical consequences (\pm 25% dose variation).

5. CONCLUSIONS

The multidisciplinary methodology implemented to prevent antineoplastic ME has proved to be a useful tool to reduce prescription ($p < 0.05$) and preparation ME ($p < 0.0001$), and exclude transcription ME. This situation decreases potential chemotherapy related problems probably to 0.2% (95% CI: 0.1- 0.4%)