

Prescription errors in chemotherapy

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Resumen

Objetivo: Describir y analizar la contribución del servicio de farmacia en la detección de errores en la prescripción de tratamientos citostáticos.

Método: Se realizó un estudio retrospectivo, revisando los errores detectados por el farmacéutico en las prescripciones de quimioterapia recibidas durante los años 2003 y 2004. Para la clasificación de los errores de medicación detectados se utilizó la taxonomía publicada por Otero y cols., recogida en el documento "Errores de medicación: estandarización de la terminología y clasificación".

Resultados: Durante el periodo estudiado se han preparado en nuestro servicio 43.188 dosis de citostáticos parenterales, para 3.959 pacientes. El número total de errores detectados ha sido de 135 (3,1/1.000 preparaciones). La distribución de los errores es la siguiente: dosis incorrecta 38,5%, omisión de medicamento 21,5%, medicamento erróneo 11,1%, frecuencia errónea y duración incorrecta 9,6% cada uno, paciente erróneo 7,4%, velocidad de administración incorrecta 1,5% y vía de administración incorrecta 0,7%. Todos los errores se clasificarían como categoría de gravedad B, ya que se solventaron en el servicio de farmacia antes de dispensar los medicamentos. Destacar que al menos 66 de ellos podrían clasificarse como acontecimiento adverso potencial. Señalar también que en 11 casos se detectaron reducciones erróneas de dosis y en 12 omisiones de citostáticos, lo que conlleva una posible disminución de eficacia terapéutica.

Díaz-Carrasco MS, Pareja A, Yachachi A, Cortés F, Espuny A. Prescription errors in chemotherapy. *Farm Hosp* 2007; 31: 161-164.

Received: 06-07-2006

Accepted: 29-05-2007

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Conclusiones: A pesar de la baja incidencia de errores detectados en la prescripción de quimioterapia, la gravedad potencial de los mismos convierte el proceso de validación farmacéutica en un punto clave para mejorar la seguridad del paciente.

Palabras clave: Errores de medicación. Errores de prescripción. Fármacos citostáticos. Quimioterapia.

Summary

Objective: To describe and analyse the role of the pharmacy department in detecting errors in the prescription of cytostatic drugs.

Method: A retrospective study was carried out over a two year period (2003-2004), which reviewed the errors detected by pharmacists in chemotherapy prescriptions. Medication errors were classified according to the system published by Otero et al. in the paper "Errores de medicación: estandarización de la terminología y clasificación" (Medication errors: standardizing the terminology and taxonomy).

Results: During the period analysed, 43,188 doses of parenteral cytostatic drugs were prepared for the treatment of 3,959 patients. A total of 135 errors were detected (3.1/1,000 preparations). Errors were distributed as follows: incorrect dose (38.5%), drug omission (21.5%), incorrect drug (11.1%), frequency error and incorrect treatment duration (9.6% each), incorrect patient (7.4%), incorrect administration rate (1.5%) and incorrect administration route (0.7%). All of the errors would be classified with a B level of seriousness, since they were resolved in the pharmacy department before dispensing the drugs. At least 66 of these could be classified as potential adverse drug events. Furthermore, 11 cases of incorrect reductions in doses and 12 cases of omissions of cytostatic drugs were detected and these errors could lead to a possible reduced treatment efficiency.

Conclusions: Despite the low incidence of errors detected in chemotherapy prescriptions, their potential seriousness gives the pharmaceutical validation process a key role in improving safety for patients.

Key words: Medication errors. Prescription errors. Cytostatic drugs. Chemotherapy.

INTRODUCTION

Medication errors are a topical subject and a source of constant concern for hospital pharmacists¹⁻³. Other professional bodies are also concerned with this issue: the plenary session on health risks of the XXII Conference of the Spanish Society of Health Care Quality made three presentations on this subject⁴⁻⁶ and the ENEAS study presented recently by the Spanish Ministry of Health and Consumer Affairs also dealt with this theme⁷.

Within the area of oncology pharmacy, the publication of the *Documento de consenso para la prevención de errores de medicación en quimioterapia*⁸ (Consensus for the prevention of medication errors in chemotherapy) was a reference point in Spain for establishing systematic practice standards to reduce the possibility of medication errors in this field.

Prescription errors have been reported as one of the greatest causes of medication errors⁹⁻¹² with an incidence of between 1.5 and 11%^{9,11}. However, according to data published in the North American database MEDMARX, there are very few prescription errors which actually affect the patient due to the high detection rates by the pharmacist or nursing staff involved in the validation/dispensing process and subsequent administration¹⁰.

Within this setting, the aim of our study was to describe and analyse the role of the Pharmacy Department in detecting errors in the prescription of cytostatic drugs.

METHOD

The study was carried out in a centralised chemotherapy preparation unit in a general tertiary referral hospital, in which an average of 21,000 annual doses are prepared. The process consists of manual medical prescription, which is validated by a pharmacist and introduced by them in the drug treatment management programme for onco-haematological patients. The corresponding labels and preparation lists are subsequently issued. The prescription review process is systematic, and is supported by Farhos Oncología® (programme for oncology), which recalculates the patient's body surface area and the dose in accordance with the protocols. The limitation of this programme is that there are no established protocols.

A retrospective study was carried out over a two year period (2003-2004), which reviewed the errors detected by pharmacists in chemotherapy prescriptions. The data were obtained from the internal register of pharmacist interventions which is systematically carried out in the area.

We used the terminology and classification system published by Otero MJ et al. for the Ruiz-Jarabo 2000 study group in the paper *Errores de medicación: estandarización de la terminología y clasificación* (Med-

ication errors: standardizing the terminology and taxonomy)¹.

RESULTS

During the period analysed, 43,188 doses of parenteral chemotherapy drugs were prepared for the treatment of 3,959 patients. A total of 135 errors were detected (3.1/1,000 preparations) from a total of 118 prescriptions.

Table I outlines the distribution of errors. Errors were mainly related to drug dose and omission. Incorrect dose errors were distributed as follows: 66% corresponded to prescription of excessive doses, 21% to inadequate doses and 13% to extra doses. Drugs omitted corresponded to 41% of chemotherapy drugs and 59% corresponded to premedication.

All of the errors would be classified with a B level of seriousness, since they were detected in the pharmacy department before dispensing the drugs.

We should mention those errors which could be classified as potential adverse drug events. Although it is difficult to carry out an assessment, the errors outlined in table II (corresponding to 50% of those detected) should be at least included in this category. As can be seen from the table, potential adverse drug events are mainly associated to the prescription of excess doses; in this respect, we should point out that from 34 cases in which an excessive dose was prescribed, this dose was greater than 20% in 28 cases [6 (< 20%), 11 (20-49%), 9 (50-99%) and 8 (> 100%)].

It is even more difficult to assess a possible reduced treatment efficiency due to incorrect dose reductions (11 cases) and due to omissions in the cytostatic drugs prescribed which patients should be administered in accordance with their treatment protocol (12 cases).

Table I. Distribution according to type of error

Type of error	No.	%
Dose	52	38.5
Drug omission	29	21.5
Incorrect drug	15	11.1
Frequency	13	9.6
Duration	13	9.6
Incorrect patient	10	7.4
Administration rate	2	1.5
Administration route	1	0.7
Total	135	

DISCUSSION

There are some descriptive studies published in this area which discuss error detection in chemotherapy¹²⁻¹⁵. These have been carried out using various methodologies, which makes comparison difficult, although Otero et al.¹

Table II. Errors detected which can be considered potential adverse drug events

Type error	No.
– <i>Incorrect dose:</i>	
Incorrect dose of cytostatic drugs (excess of > 20%)	28
Dose of Mesna with ifosfamide (10 times lower)	1
Extra doses of epirubicin	1
– <i>Drug omission:</i>	
Mesna in treatment with ifosfamide	5
Premedication with paclitaxel	1
Folinic acid rescue in treatment with methotrexate (300 mg/m ²)	2
Antiemetics	8
– <i>Incorrect drugs:</i>	
1,000 mg paclitaxel instead of cyclophosphamide (ovarian cancer)	2
Association between anthracycline and trastuzumab	1
– <i>Incorrect patient:</i>	
Mix-up with patient identification labels	10
– <i>Incorrect duration:</i>	
Prescription of an additional cycle of adjuvant therapy	1
– <i>Frequency of incorrect administration:</i>	
Prescription of treatment 1-2 weeks before required	6
Total	66

provide terminology and a common classification system to make comparisons between various hospitals in the future. Goyache et al.¹⁴, who use a similar methodology to ours mainly detected dose errors (> 50% of errors detected), followed by incorrect treatment duration and incorrect patient errors. Creus et al.¹² carried out a study which analysed the errors found in a voluntary register system, using the same reference for classification. In their results, 50% of registers corresponded to prescription errors and of these, 51% were dose errors, followed by 12.3% for omission errors. These were also the most frequent errors found in our study.

In the international setting, we should highlight the study carried out by Gandhi et al.⁹, who identified and classified medication errors and their potential to cause adverse drug events in a prospective manner using rigorous methodology in out-patient clinics for onco-haematological patients. These authors found an incidence of medication errors of 3%, which mainly corresponded to prescription errors. The type of errors which they most frequently found corresponded to dose errors and prescription omissions.

Our results may have been influenced by the working system of the hospital. In our study, premedication,

antiemesis and hydration were only indicated in the prescription for hospitalised patients, while in the hospital day unit, the nurse directly administered treatment in a standardised way. As a result, the number of errors detected is extremely high for the minimum percentage of prescriptions in which these were included. The type and volume of solvent and administration times were also pre-determined by the pharmacy department, thus reducing the possibility of errors. However, treatment protocols were not established and various dose ranges were used. This made detection of errors difficult and added a variability component to the validation process.

Otero et al.¹ point out the importance of the analysis of potential adverse drug events since it identifies the areas where the system fails, where errors occur, the areas in which it functions and the errors which are avoided. Consequently, in our study, at least 50% of the errors could have caused adverse drug events in patients. Gandhi et al.⁹ carried out a more in-depth study and they consider that 82% of errors detected in their study were potential adverse drug events.

Our results showed that in 17% of errors, there were drug reductions or omissions which could have affected treatment efficiency. On various occasions, these errors occurred in treatments for potentially curable illnesses, such as cases of testicle lumps or adjuvant therapy for breast cancer, which gives us an indication of their potential importance.

We believe that the main importance of our results lies in the fact that these are not the outcome of a specific intervention, but are due to the daily work carried out by pharmacists in the area, where 100% of prescriptions received are validated and the errors detected are registered. Consequently, despite the apparently low incidence of prescription errors detected in our study, the potential seriousness of these errors gives the pharmaceutical validation process a key role in improving safety for onco-haematological patients.

In the future, it would be interesting to research the cause of the errors in the prescription of cytostatic drugs, and therefore establish corrective measures to prevent these. The human factor is among one of the possible causes to be researched, which can be linked to an excessive workload and mistakes, writing errors, calculating doses and mixing up patients' identification labels, in addition to other contributing factors which are the result of the lack of standardisation of procedures and treatment protocols.

References

- Otero López MJ, Codina Jané C, Tamés Alonso MJ, Pérez Encinas M, en representación del grupo de trabajo Ruiz-Jarabo 2000. Errores de medicación: estandarización de la terminología y clasificación. *Farm Hosp* 2003; 27: 137-49.
- American Society of Health-System Pharmacists. ASHP guidelines on preventing medication errors with antineoplastic agents. *Am J*

- Health-Syst Pharm 2002; 59: 1649-69.
3. Cohen MR, Anderson RW, Attilio RM, Green L, Muller RJ, Pruemer JM. Preventing medication errors in cancer chemotherapy. *Am J Health-Syst Pharm* 1996; 53: 737-46.
 4. Woloshynowych M. Using case record review to improve patient safety. *Rev Calidad Asistencial* 2004; 19 (Extra. 1): 7-8.
 5. Michel PH. Management of patient safety in French hospitals. *Rev Calidad Asistencial* 2004; 19 (Extra. 1): 9-10.
 6. Aranaz JM. Proyecto IDEA: Identificación de efectos adversos. *Rev Calidad Asistencial* 2004; 19 (Extra. 1): 10-4.
 7. Ministerio de Sanidad y Consumo. Presentación de los resultados del estudio ENEAS (Estudio Nacional de Efectos Adversos) (citado 11-05-2006). Disponible en: <http://www.msc.es/gabinetePrensa/nota-Prensa/desarrolloNotaPrensa.jsp?id=595>
 8. GEDEFO. Documento de consenso para la prevención de errores de medicación en quimioterapia. Disponible en: http://www.amgen.es/amgen2/grupos/errores_medicacion.htm.
 9. Gandhi TK, Bartel SB, Shulman LN, Verrier D, Burdick E, Cleary A, et al. Medication safety in the ambulatory chemotherapy setting. *Cancer* 2005; 104: 2477-83.
 10. Hicks RW, Cousins D, Williams RL. Selected medication-error data from USP's Medmarx program for 2002. *Am J Health-Syst Pharm* 2004; 61: 993-1000.
 11. Barber N, Rawlins M, Dean Franklin B. Reducing prescribing error: competence, control and culture. *Qual Saf Health Care* 2003; 12: 29-32.
 12. Creus N, Massó J, Sotoca JM, Nigorra M, Castellá M, Valverde M, et al. Errores de medicación y farmacia oncológica. *Farm Hosp* 2002; 26 (Supl.): 110.
 13. Aguirrezábal Arredondo A, Álvarez Lavín M, Turrebaso Ibarreche MJ, Vilella Ciriza ML, Elguezabal Ortúzar I, Goikolea Ugarte FJ, et al. Detección de errores en la prescripción de quimioterapia. *Farm Hosp* 2003; 27: 219-23.
 14. Goyache Goñi MP, Vicario Zubizarreta MJ, García Rodríguez MP, Cortijo Cascajares S, Esteban Gómez MJ, Herreros de Tejada A. Errores de prescripción en citostáticos: Análisis de sus causas y propuestas para prevenirlos. *Farm Hosp* 2004; 28: 361-70.
 15. Vuelta Arce M, Calabuig Muñoz M, Jornet Montaña, Canadell Vilarrasa L, Riera Sendra G, Chumillas Chevalier E, et al. Evaluación de la calidad en el proceso de utilización de fármacos peligrosos: Prescripción y preparación. *Farm Hosp* 2005; 29: 119-25.