



ORIGINAL ARTICLE

Nursing interventions as part of an integral pharmaceutical care team

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KEYWORDS

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Abstract

Objective: To describe interventions carried out by nurses in the Pharmaceutical Care Unit upon discharge and in Outpatient Consultation (FACE) with the aim of promoting effective, safe and efficient pharmacotherapy for hospitalised patients.

Method: A descriptive study of nursing activity carried out in the Outpatient Consultation Unit between April 2008 and March 2009. The nurse performs five specific, formalised activities: clarifying differences in the medical records related to drugs allergies or intolerances, identifying pharmacotherapy discrepancies between acute and chronic treatment, identifying opportunities for improving pharmacotherapy, contributing to patient education about his/ her treatment upon admission and dispensing limited duration drugs (less than 30 days) upon discharge to avoid accumulation of medication at home.

Results: During the study period the nurse took part in the pharmacotherapy administered to 1360 patients (57.6% of total patients treated by the integral pharmaceutical care team), for a total of 1709 individual interventions. These interventions were performed in order to clarify differences in medical records regarding drug allergies or intolerances (n=111), to identify pharmacotherapy discrepancies between acute and chronic treatment (n=118), to identify opportunities for improving pharmacotherapy (n=263), and upon discharge in order to educate the patient about his/ her treatment (n=31) and to dispense limited duration drugs (n=1186).

Conclusions: The nurse's contribution to the integral pharmaceutical care team helps to improve the quality of pharmacotherapy in terms of effectiveness, safety and efficiency pharmacotherapy.

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PALABRAS CLAVE

Errores de medicación;
 Conciliación de la medicación;
 Funciones de enfermería;
 Coordinación internivel

Actividades de enfermería como parte de un equipo de atención farmacéutica integral

Resumen

Objetivo: Describir las intervenciones desarrolladas por la enfermera adscrita a la Unidad de Atención Farmacéutica al alta y en Consultas Externas (FACE) con el fin de promocionar una farmacoterapia efectiva, segura y eficiente en el paciente hospitalizado.

Método: Estudio descriptivo de la actividad de enfermería asignada a la Unidad FACE entre abril de 2008 y marzo de 2009. La enfermera tiene asignadas cinco actividades específicas y protocolizadas que son: clarificar diferencias en los registros de alergias/intolerancias a medicamentos, identificar discrepancias relativas al tratamiento farmacoterapéutico crónico, identificar oportunidades de mejora farmacoterapéutica, mejorar el conocimiento de los tratamientos prescritos al alta y evitar el acúmulo de medicación en los domicilios mediante la dispensación de tratamientos de duración limitada (inferior a 30 días).

Resultados: Durante el periodo de estudio la enfermera actuó en 1.360 (57,6%) pacientes de los 2.362 pacientes atendidos por la Unidad FACE. La enfermera realizó un total de 1.709 intervenciones de las cuales 111 fueron para resolver diferencias en el registro de alergias/intolerancias a medicamentos, 118 para solucionar discrepancias en el tratamiento crónico, 263 fueron por identificación de oportunidades de mejora farmacoterapéutica, 1.186 dispensaciones de tratamientos de duración limitada y 31 estuvieron orientadas a mejorar la educación farmacoterapéutica de los pacientes al alta hospitalaria.

Conclusiones: La enfermera contribuye a la consecución de los objetivos generales de la unidad FACE y por lo tanto a la mejora de la calidad farmacoterapéutica en términos de efectividad, seguridad y eficiencia.

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Introduction

Healthcare consists of a multifactorial, complex process where patients are attended to by different professionals, in several locations and at different healthcare levels. Coordination between these professionals is of utmost importance, given that the quality of the care received and the healthcare system's efficiency depend upon it. This is why healthcare coordination improvement has been, and continues to be a priority and a challenge for many healthcare systems.¹

Coordination between levels of healthcare also affects the pharmacotherapeutic regimen's continuity. Lack of continuity occurs because the transition between the different levels of healthcare is likely to cause medication errors.^{2,3} As such, half of the medication errors are related with changes in the patient's healthcare and/or doctor.⁴

A medication error is "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer."⁵ Medication errors are the main cause of morbidity in hospitalised patients⁶ and it is estimated that 12% of patients experience an adverse effect related to treatment changes during the first two weeks after hospital discharge.⁷ Therefore, our health system should prioritise implementing strategies that encourage preventing, identifying and resolving these errors as early as possible.⁸

In 2005, our hospital opened a FACE Unit (pharmaceutical care unit upon discharge and external consultations) which aims to promote effective, safe, and efficient

pharmacotherapy by means of integral pharmaceutical care and inter-level coordination. There are 2 pharmacists and 1 nurse in this Unit, employed by the Pharmacy Department. They attend to patients from the Internal Medicine, Traumatology and Urology wards throughout the healthcare process (admission, stay, discharge).

So as to achieve the FACE Unit's main objective, the nurse performs 5 specific tasks that have been agreed upon consensus and are standardised. Each task is developed within a different stage in the hospitalisation process (admission, stay, discharge); before performing each task she or he must consult several data sources (clinical histories, patient interviews, pharmacy records, etc.) Table 1 shows the data sources that the nurse consults depending on the patient's stage of hospitalisation, and Table 2 shows the data extracted from the data sources that the nurse needs to consult before performing the tasks.

This study aims to describe the tasks performed by the FACE nurse so as to achieve the Unit's general objectives.

Method

We conducted an observational, prospective study on all the patients admitted to the Orthopaedic Surgery and Traumatology, Urology and Internal Medicine wards, between 1 April 2008 and 31 March 2009.

The nurse performed the following tasks:

1. Check differences for records regarding drug allergies/intolerances. On admission, the nurse reviewed data

Table 1 Data sources that the nurses consulted depending on the patient's hospitalisation stage

| Data source (computer software) | Hospitalisation stage | | |
|--|-----------------------|------|-----------|
| | Admission | Stay | Discharge |
| PC clinical history (e-SIAP®) | X | | |
| SC nursing records (GACELA®) | X | X | X |
| Laboratory, discharge reports (HP-HCIS®) | X | X | X |
| SC clinical history (not computerised) | X | | X |
| SC pharmacotherapeutic history (Hospiwin®) | X | X | X |
| Patient or referred carer | X | | X |

PC indicates primary care; SC, specialist care.

Table 2 Data extracted from the data sources that the nurse needs to consult before performing the tasks

| Extracted data | Data source | | | | | | |
|-----------------------------|-------------|--------------------|------------|-------------------|----------------|-------|---------------|
| | Electronic | | | | Non electronic | | |
| | CH PC | SC nursing records | Laboratory | Discharge reports | PH SC | CH SC | Patient/Carer |
| Administrative data | X | X | | | X | X | X |
| Cause of admission | | X | | | | | |
| Patient history | X | X | | X | | | |
| Socio-family background | X | X | | X | | | X |
| Drug allergy | X | X | | X | X | X | X |
| Chronic treatment | X | X | | X | | | X |
| Acute treatment | | | | | X | | |
| Lab. and microbiology tests | | | X | | | | |

CH indicates clinical history; PC, primary care; PH, pharmacotherapeutic history; SC, specialist care.

- regarding drug allergies/ intolerances found in the patient's electronic records. If differences were found among the data sources, then the head ward nurse is informed, the patient interviewed and his or her clinical history checked. Once checked, it was recorded on primary care and specialist care clinical history records.
- Identify discrepancies in chronic pharmacotherapeutic treatment.

Discrepancies identified by the nurse are caused by changing between levels of healthcare during the process, i.e. from admission to discharge. This task focused on obtaining a complete and detailed list of the patient's chronic medication, and comparing it with those prescribed upon admission or discharge.⁹ The nurse revised hospital admissions for patients under 65 years of age, who were expected to have a less complex pharmacotherapy, and all hospital discharges. Any discrepancies found were communicated to the pharmacist to be checked and resolved. The pharmacist would then contact the prescribing doctor to find out whether the discrepancy was intentional, and if this were not the case, it was classified as medication error

(reconciliation error).¹⁰ We used Climente et al's manual¹¹ as a reference to classify medication errors and medication-related problems.

- Identify opportunities to improve the pharmacotherapy. This task was mainly performed during hospital stay. The nurse identified patients under intravenous treatment with:
 - Antibiotics:** The nurse checked that the antibiotic prescribed and its dosage was in accordance with the culture results, antibiogram and patient's kidney function. If this was not the case, the nurse communicated the discrepancy to the pharmacist for it to be checked and resolved.
 - Proton pump inhibitors for less than 72 h:** The nurse examined oral tolerance. If tolerance was adequate and once the pharmacist had been consulted, the nurse would propose a change in the administration route to the patient's doctor.

Therapeutic exchanges upon hospital discharge to limited-duration treatment drugs, not included in the Drug Therapy Guidelines, were also considered as an improvement opportunity (more cost effective).

4. Improve patient's knowledge of treatments prescribed upon discharge. The nurse had to ensure that the patients understood the basic characteristics of the treatment prescribed upon discharge. Patients likely to have difficulties adhering to treatment were therefore prioritised (e.g. elderly patient with no carer, with mild sensory or cognitive abnormalities and lack of understanding towards chronic treatment). Patients whose usual treatment had changed greatly or those starting treatment with inhalers were also considered. The nurse explained the treatment orally and with the help of a printed (Figure) or electronic booklet (Infowin[®]) where the basic characteristics of the prescribed drugs were specified: name, indication, and administration route/ time.
5. Prevent accumulation of medication at home. All units necessary for completing limited-duration (>30 days) treatments were dispensed, such as low-molecular-weight heparin, corticoids, antibiotics analgesics, etc. The nurse always informed the patient (both orally and with printed booklets) about the medication (name, indication, administration route and time, common adverse reactions, and treatment duration) to make it

easier for the patient to understand the treatment, and therefore improve adherence.

Nursing tasks were recorded on an Excel 2003 sheet, while medication-related problems and errors were recorded and analysed using statistical package 11.5 for Windows.

Results

During the study period, 2362 patients were admitted to the Clinical wards and attended to by the FACE Unit. The FACE nurse had to check 6 out of every 10 patients admitted (total 1360 patients), performing 1709 interventions. Table 3 shows the distribution of the interventions by task. The tasks that required the greatest number of interventions were to prevent accumulation of medication at home, and identifying possible opportunities to improve pharmacotherapy, representing 70% and 15%, respectively, of all interventions performed by the nurse.

Checking records for differences regarding drug allergies/intolerances

A total of 111 discrepancies were identified and resolved using the various records concerning drug allergies/interventions. The FACE nurse had to perform an emergency intervention for 8 (7.2%) of these discrepancies, because the patient was prescribed a drug to which he or she was allergic/intolerant. Except for one case, the drug allergy or intolerance was due to medication prescribed upon hospital admission. For the other case, the drug was prescribed upon discharge. Allergy types were penicillin (n=4), pyrazolone (n=1), sulfonamide (n=1), iodine (n=1) and nebivolol (n=1).

Identifying discrepancies in chronic pharmacotherapeutic treatment

The nurse identified 118 discrepancies between chronic pharmacotherapy treatment and prescribed treatment upon hospital admission and discharge. Of these discrepancies, 37 (31.4%) were confirmed by the doctor as treatment reconciliation errors. 70.2% of these errors affected drugs

| Name and surname(s): | | Date: 28 January 2009 | | | | | |
|--|-------------------|-----------------------|-----------|-------|-----|--------------|---------|
| Drugs and dosage | Indication | 8 h | Breakfast | Lunch | 16h | Dinner | Bedtime |
| OMEPRAZOLE 20 MG | STOMACH PROTECTOR | 1 | | | | | |
| SEGURIL 40 MG | DIURETIC | 1 | | | | | |
| BOI-K aspartic (Potassium L-ascorbate) | POTASSIUM | | | 1 | | | |
| EXFORGE 10/160 MG | BLOOD PRESSURE | 1 | | | | | |
| ADIRO 100MG | HEART | 1 | | | | | |
| NITRODERM TTS 5 MG | HEART | APPLY PATCH | | | | REMOVE PATCH | |
| ALLOPURINOL 300 MG | URIC ACID | 1 | | | | | |
| VENTOLIN Inhaler | BREATHING | 2 | | | 2 | | 2 |
| ATROVENT Inhaler | BREATHING | 2 | | | 2 | | 2 |
| DUOTRAV Eye drops | GLAUCOMA | | | | | | |
| AMOXICILLIN + CLAVULANIC ACID 875/125 | ANTIBIOTIC | 1 | | | 1 | | 1 |
| DACORTIN 30 (PREDNISONE) | CORTICOID | SEE PLAN | | | | | |

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Figure 1 Example of a pharmacotherapeutic information booklet.

Table 3 Distribution of the nursing interventions by task

| Task | Interventions | |
|---|---------------|--------------|
| | No. | % |
| Checking records for differences regarding drug allergies/ intolerances | 111 | 6.5 |
| Identifying possible discrepancies in medication | 118 | 6.9 |
| Identifying opportunities to improve pharmacotherapy: | 263 | 15.4 |
| Use of antibiotics | 188 | 9.5 |
| Use of proton pump inhibitors | 52 | 2.6 |
| Therapeutic exchange upon discharge | 23 | 1.2 |
| Improving patient's knowledge of treatments prescribed upon discharge | 31 | 1.8 |
| Preventing accumulation of medication at home | 1186 | 69.4 |
| Total | 1709 | 100.0 |

Table 4 Distribution of the reconciliation errors by pharmacotherapeutic group

| Pharmacotherapeutic group | Reconciliation errors | |
|--|-----------------------|-------|
| | No. | % |
| Cardiovascular system | 13 | 35.1 |
| Blood and haematopoietic system | 7 | 18.9 |
| Nervous system | 6 | 16.2 |
| Alimentary tract and metabolism | 3 | 8.1 |
| Systemic hormonal preparations (excluding sex hormones) | 2 | 5.4 |
| Anti-infective agents | 2 | 5.4 |
| Respiratory system | 2 | 5.4 |
| Genitourinary system and sex hormones | 1 | 2.7 |
| Antineoplastic agents and immunomodulators | 1 | 2.7 |
| Total | 37 | 100.0 |

Table 5 Medication-related problems caused by reconciliation errors

| Medication-related problems | Reconciliation errors | |
|-----------------------------|-----------------------|-------|
| | No. | % |
| Non-adherence | 19 | 51.4 |
| Not indicated | 7 | 18.9 |
| Inadequate dosage/ interval | 4 | 10.8 |
| Adverse effect | 3 | 8.1 |
| Inadequate duration | 2 | 5.4 |
| Duplicated therapy | 2 | 5.4 |
| Total | 37 | 100.0 |

for the cardiovascular, blood and haematopoietic, and nervous systems (Table 4). 70.3% of the reconciliation errors were identified and resolved upon discharge, while the remaining 29.7% were identified upon admission. For most cases, reconciliation errors hindered treatment continuation, but other reconciliation errors caused problems because the drugs were wrongly prescribed for the patient's condition or because of dosage adjustments (Table 5). The interventions performed by the nurse at this level improved effectiveness for 54.1% cases (n=20), safety for 32.4% (n=12) and treatment efficiency for 13.5% (n=5).

Identifying opportunities to improve pharmacotherapy

The nurse identified 263 improvement opportunities. Improvements involved intravenous antibiotics on 188

occasions (71.5%), proton pump inhibitors on 52 occasions (19.8%) and limited-duration medication prescribed upon discharge and likely to change on 23 occasions (8.7%). Only 42 (16.0%) of these improvement opportunities actually involved changing treatment, considering its clinical situation. As such, the FACE nurse intervention led to 11 antibiotic improvements (6 administration route and method, and 5 dosage adjustments or therapeutic interval regarding patient's kidney function), 8 changes to oral proton pump inhibitors, and 23 therapeutic exchanges on discharge.

Improving patient's knowledge of treatments prescribed upon discharge

The nurse dispensed limited-duration treatment to all patients, and provided them with information about their medication both orally and in written format (1186 patients). Thirty-one of the discharged patients (total 1795 patients) benefited from detailed pharmacotherapeutic information given by the nurse, including an oral description of the treatment and a printed or electronic leaflet.

Preventing accumulation of medication at home

The most common FACE nurse intervention was to dispense limited-duration medication upon discharge. The nurse dispensed 43 796 units to 1186 patients, which represents active dispensation of 7 out of every 10 discharged patients (total 1795 patients). Drugs dispensed by the nurse were mainly analgesics (27.1%), followed by heparin and by-products (18.6%) and systemic antibacterial agents (15.5%).

Discussion

A recent systematic review revealed that several interventions by multidisciplinary teams effectively prevent medication errors. However, the particular contribution that nursing staff make to drug-related patient security is still not known.¹² Furthermore, during our review of the literature, we have not found studies where the nursing staff performs several tasks associated with drug safety, efficiency and effectiveness over different stages of the healthcare process.

Recording drug allergies and intolerances is common nursing practice, which as part of the multidisciplinary team, contributes to in-depth clinical history compilation.^{13,14} Nevertheless, we did not find studies on the use of nursing staff to resolve discrepancies found at different levels of healthcare either. We found 111 patients with allergy/intolerance-related discrepancies on their clinical history, meaning that 4 out of every 100 admitted patients have allergy-related discrepancies on their records. When identified, 7% of patients with discrepancies had already been prescribed the medication to which they were allergic. This confirms the need to establish strategies which guarantee clinical history uniformity and early drug allergy diagnosis programmes, aiming at preventing this type of medication error from causing risk to pharmacotherapeutic morbidity.

Nurses play an essential role in identifying chronic medication-related discrepancies, given that they are qualified healthcare staff and because they are in constant contact with the patient. This has been highlighted by several authors in various improvement strategies.¹⁵⁻¹⁷ The reconciliation errors found in our study are in line with those reported by other authors in our field,^{18,19} where the most common error is drug omission. Conversely, nurses have identified more reconciliation errors upon discharge as opposed to upon admission, and the percentage of discrepancies due to reconciliation errors is also smaller (31% in our study while other authors have reported 55%-59%). We believe that the cause of these differences lays in the methodology used: in our study, the nurse only reviewed the admissions with less complex pharmacotherapy, while examined all hospital discharges. This was designed to reduce the number of medication errors generated by changes in levels of healthcare and improve the patient's healthcare continuity.

In our study, we have shown that the nurse can contribute to identifying pharmacotherapy improvement opportunities, usually developed by the pharmacy department, such as sequential therapy (antimicrobial agents and proton pump inhibitors),²⁰ therapeutic exchange,²¹ and dosage adjustment as per kidney function.²² However, new patient selection criteria are needed to improve process effectiveness, since only 16 out of every 100 discrepancies actually involved treatment changes.

Multiple and/or chronic disorders and a high number of drugs prescribed are factors that have an effect on adherence.²³ Therefore, the study conducted by Castellano-Muñoz et al on independent patients over 65 years of age shows that only 8.6% of patients adhered to the treatment prescribed. It also highlights that the most common cause for not adhering is a lack of understanding.²⁴ In some wards of our hospital it was already common, but not standardised practice, for nurses to explain a prescribed treatment to their patients upon discharge. The novelty of this pharmaceutical healthcare programme is the standardised way of informing patients, orally and with a written pharmacotherapeutic information booklet. This information is mostly provided for medication dispensed upon discharge. This measure improves adherence and prevents an unnecessary accumulation of medication at the patient's home, which could be dangerous and costly to the health system. A lot of time must be invested into each detailed informative session about pharmacotherapeutic treatment (around 1 hour per patient), meaning that it only can be used for very specific cases.

The nurse performs his or her tasks that help the FACE Unit achieve its general objectives, therefore contributing to improving pharmacotherapeutic quality in terms of effectiveness, safety and efficiency.

Conflict of interest

The authors affirm that they have no conflict of interest.

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