



ORIGINAL ARTICLE

Establishment of a quality indicator for pharmaceutical care[☆]

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KEYWORDS

Pharmaceutical care;
Quality indicator;
Pharmaceutical
intervention;
Computerised clinical
history;
Electronic
prescription

Abstract

Objective: To establish a quality indicator for pharmaceutical care in an integral system for personalised medication dispensing (ISPMD) with electronic prescription.

Methods: Descriptive transversal study. Period: 2007. On a daily basis, we revised the pharmaceutical treatment of patients admitted to hospital units with ISPMD. Study variables: a) suitability of pharmaceutical interventions: important or very important; b) acceptance of those interventions. The LASER® method was used to identify patients with improvement opportunities.

Results: In absolute terms (mean [SD]): important pharmaceutical interventions, 26.6 (14.8); very important, 31.5 (24.6); acceptance, 57.5 (25.9). Percentages (95%CI): pharmaceutical interventions: important, 33.7 (9.3-58.0); very important, 39.80 (17.7-62.2); acceptance, 72.6 (64.7-80.5).

Conclusions: Implementation of the quality indicator for pharmaceutical care allowed us to evaluate the clinical significance and the acceptance rate of the pharmaceutical care being provided.

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PALABRAS CLAVE

Atención
farmacéutica;
Indicador de calidad;
Intervención
farmacéutica;
Historia clínica
informatizada;
Prescripción
electrónica

Establecimiento de un indicador de calidad de atención farmacéutica**Resumen**

Objetivo: Establecer un indicador de calidad de atención farmacéutica en un centro con sistema integral de dispensación individualizada de medicación (SIDIM) y prescripción electrónica.

Métodos: Estudio descriptivo transversal. Periodo: año 2007. Se realizó una revisión diaria del tratamiento farmacoterapéutico de los pacientes ingresados en unidades de hospitalización con SIDIM. Variables de estudio: a) idoneidad de las intervenciones farmacéuticas: importantes, muy importantes, y b) aceptación de éstas. Para la identificación de pacientes con oportunidades de mejora en su farmacoterapia se empleó la metodología LASER®.

Resultados: En términos absolutos (media $\pm$ desviación estándar): intervenciones farmacéuticas importantes, $26,6 \pm 14,8$; muy importantes, $31,5 \pm 24,6$; aceptación, $57,5 \pm 25,9$. En porcentaje (intervalo de confianza del 95 %): intervenciones farmacéuticas importantes, 33,7 (9,3-58,0); muy importantes, 39,80 (17,7-62,2); aceptación, 72,6 (64,7-80,5).

Conclusiones: La implantación del indicador de calidad de atención farmacéutica ha permitido evaluar la significación clínica y el grado de aceptación de las intervenciones farmacéuticas realizadas.

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Introduction

In line with the development that there has been in the hospital sphere, professional practice for hospital pharmacist has evolved during the course of the last number of decades, and has adapted to the new health care reality. This evolution has been reflected in a change of activity, whereby the pharmacist has moved from the acquisition, elaboration, and dispensation of medicines, medicine oriented activities, to focussing on the patient, which has given rise to a new activity, that of pharmaceutical care. The fundamental objective of this new activity is to achieve results which improve the patient's quality of life by means of the responsible provision of pharmacological treatment, that is, ensuring that the patient receives the appropriate medicine at the most suitable dosage level and by the most suitable method of administration for the correct period of time.^{2,3}

As a result of this new approach by professional hospital pharmacists, both their integration into health care teams and the use of new strategies,⁴ which enable the identification of "improvement opportunities" in the quality of the pharmacotherapy that the patient receives, have become indispensable. "Improvement opportunities" in pharmacotherapy means any situation or incident in which the patient's pharmacotherapy⁵ can be optimised by means of a pharmaceutical intervention (PI). Early identification of such opportunities leads to the detection of medication-related problems (MRP), which may or may not originate in medication errors (ME), and which allow the pharmacist the opportunity to intervene in a proactive and interdisciplinary manner in the care of each individual patient.

Recently, the 46 Member States of the Council of Europe⁶ elaborated a consensus document with a series of recommendations designed to prevent and/or minimise ME, amongst which particularly of note are the pharmaceutical

validation of medical prescriptions and the use of electronic prescriptions (EP). The integration of EPs into health care practice increases the transparency of a great number of the processes which form part of the therapeutic chain, automates routine processes and thereby increases the efficiency of the pharmacotherapy.

The benefits of pharmaceutical care in the hospital context are documented⁸⁻¹⁰ in numerous studies published in this sphere, which as a rule, show positive results.¹¹ However, it is not easy to quantify such benefits as many elements intervene in the results, the organisation, the type of patient, inter-professional relationships and the experience and skills of the actual pharmacist.¹⁰

To improve the quality of the pharmaceutical care provided, as is the case in any other activity involving care, periodic evaluation is required to identify and optimise areas of improvement. Introducing indicators based on objectives proposed at the outset will allow us to measure the quality of pharmaceutical care and, at the same time, to establish benchmarks with the results obtained. Various studies¹²⁻¹⁵ have used a variety of indicators to measure the quality of pharmaceutical care. However, the lack of standardisation of this pharmaceutical activity and the poor quality of the studies make it difficult to obtain validated measuring tools which serve to provide guidelines for monitoring, evaluating or improving the quality of pharmaceutical care.

The objective of this study is to establish a pharmaceutical care quality indicator on the basis of the acceptance and suitability of PIs carried out to prevent and/or resolve MRP in a centre equipped with SIDIM and EP.

Method

A transversal descriptive study carried out in a centre with a total of 230 beds distributed on four hospitalisation floors

Editar
 Asistencia
 Gráfica de temperaturas
 Preoperatorio
 Pruebas complementarias
 Historial
 Cerrar

Ficha del paciente

Nombre:		Proceso:	
Relacionado:		Historial:	U-140866
Cliente:	ASEPEYO MATE P.S.S. Nº 151	Planta:	480683
Habitación:		Nacido el:	PLANTA 4
Doctor:		Fecha de ingreso:	30/07/1957
Fecha de ingreso:	17/04/2008	Fecha de alta:	

Evolución | Dieta | Tratamiento | Histórico de medicación prescrita

Alergias: NO MEDICAMENTOSAS: no alergia medicamentosa, alergia al polen

- Líneas en estado adecuado
 - Líneas con caducidad p.
 - Líneas pendientes de revisión
 - Líneas caducadas

Fecha inicio	Hora méd	Fecha fin	Medicación	Dosis	Vía	Pauta médico	Observaciones	Doctor
05/05/2008	14:17:39	03/08/2008	ENANTYUM I.V. amp. 50 mg.	1 amp.	Intravenosa	C/8h		
02/05/2008	12:49:27	01/06/2008	IDALPREM comp. 5 mg.	1 comp.	Oral	C/24h - 21h	para dormir	
28/04/2008	13:38:05	27/07/2008	EFFERALGAN 1G-COMP EFERV comp. 1 g.	1 comp.	Oral	C/6h		
28/04/2008	13:37:42	27/07/2008	NEXIUM MUPS comp. 40 mg.	1 comp.	Oral	C/24h - 9h		
18/04/2008	18:09:45	17/07/2008	ADIRO comp. 100 mg.	1 comp.	Oral	C/24h - 9h		
17/04/2008	23:09:09	16/07/2008	CLEXANE 40 MG (4.000 UI)	1 jeringa	Subcutánea	C/24h - 21h		

Figure 1 Electronic preregistration Aitana Historiales Clínicos (Clinical Records) Application. Aitana SBS®.

equipped with SIDIM since December 2006. Furthermore, it is furnished with emergency services, ICU, surgery room, outpatients practice, laboratory, magnetic resonance, rehabilitation, and radiology, in which traditional dispensation takes place using first aid kits with minimum pre-established stocks.

To obtain the data we used 2 of our own inter-related computer programmes:

1. Aitana Historiales Clínicos. Aitana SBS® (Figure 1). Enables consultation of the clinical and pharmacotherapeutic history and facilitates access to the nursing record which contains the medication that has been dispensed and administered.
2. Aitana AS-400. Aitana SBS®. Enables the management and maintenance of medicines and health care products, as well as the validation of orders placed by the hospitalisation units and the medication included in the unit dosage trolleys.

In this context, a daily review was carried out in 2007 of the pharmacotherapy of patients admitted to hospitalisation units equipped with SIDIM. To identify patients with improvement opportunities, LASER® methodology was used, which has the following sequential processes: patient identification, PI, pharmacotherapeutic monitoring, evaluation, and results. Once an improvement opportunity in an individual patient's pharmacotherapy was identified, his or her clinical history was checked, including analytical data, the clinical evolution record, the treatment history, and the nursing record. Once all necessary information had

been gathered, the PI for optimising the treatment was carried out in the computerised clinical history, by means of interconsultation (Figure 2) with the doctor responsible for the patient, based on pharmaceutical recommendations. An individualised pharmaceutical monitoring form was drawn up (IPMF)² (Figure 3), in which aspects relating to the MRP were duly registered: identification, origin and description and, following the PI: classification (to prevent or to resolve an ME and/or a MRP), description, acceptance, and suitability.

As variables of the study, the following aspects were evaluated on a bi-monthly basis: a) the suitability of the PI carried out, by means of the calculation of the percentage of PI considered "important" (recommendations based on standard care practice, protocols, or guidelines) and "very important" (to prevent situations which require additional treatment and/or an increase in monitoring, serious adverse reaction, and/or therapeutic failure) resulting in the improvement in patient care with regard to the total of PIs carried out; and b) the percentage of PIs accepted by the doctor with regard to the total of PIs carried out after a time limit of 72 hours following the communication of the recommendation.

Statistical analysis of the data was carried out using the program GSTAT® version 1.2 according to the distribution calculation (arithmetic average), dispersion (standard deviation [SD]) and precision (95% of confidence interval [CI]).

In order to establish a quality indicator, this study was presented to the members of the Centre's Management Committee, so that it might undergo a trial period of

HOJA DE INTERCONSULTA

Centro de Recuperación y Rehabilitación de Levante

Ficha del paciente

Paciente: [Redacted]
 Hospitalización: 419H
 Proceso: H-75468 Historia: 454739
 Entidad aseguradora: [Redacted]

Datos de la solicitud

Del médico: [Redacted] Especialidad: FARMACIA
 Al médico: [Redacted] Especialidad: CIRUGIA PLASTICA
 Urgente: ☒ SI ☐ NO
 Fecha solicitud: 09/08/2007 Hora solicitud: 13:36
 Que se desea del médico consultado: Te adjunto información de la ficha técnica del Enantyum, en cuanto a posología y duración de tratamiento, las formas parenterales se usan para tratamiento sintomático del dolor agudo de moderado a intenso, cuando la administración oral no es apropiada y en uso a corto plazo, limitando el tratamiento al periodo sintomático agudo (no más de 2 días). Se aconseja que los pacientes adopten un tratamiento analgésico por vía oral cuando éste sea posible, o bien si precisa la vía parenteral, tratar con otro principio activo (y luego reiniciar si se desea continuar con el periodo de duración establecido).
 Un cordial saludo
 Resumen de diagnósticos y procedimientos:

Figure 2 The consultancy form. Aitana Historiales Clínicos (Clinical Records) Application. Aitana SBS®.

1 year to thereby evaluate its incorporation into the CT Plus® total quality programme, which has been implanted in the hospital in accordance with regulation ISO 9001:2000.

Results

Six thousand hundred fifty-four patients participated in the study (78% males and 22% females) with an average (standard deviation [SD]) age of 38 (12) years. In the event of a patient being admitted on various occasions, he or she was counted only once.

The average time spent in hospital was 8.6 days per patient (95%CI, 7.2-9.1).

For every 100 patients, 8 PIs were carried out, giving a total of 475 throughout the duration of the study. The PI average per twice monthly period was 79 (95%CI, 53.7-104.6).

With regard to the suitability of the PIs, the results corresponding to those PIs classified as "important" or "very important" can be seen in Tables 1 and 2. In Table 1, per twice monthly period in absolute terms and in percentage together with the total datum (year 2007) with its precision (95%CI) and in Table 2, per twice monthly period, and according to the distribution calculation (arithmetic average), dispersion (SD), and precision (95%CI).

The results corresponding to the acceptance of the PI can be seen in Tables 3 and 4. In Table 3, per twice monthly period in absolute terms and in percentage and the total datum (year 2007) with its precision (95%CI), and in Table 4, per twice monthly period and according to the calculation of the distribution (arithmetic average), dispersion (SD), and precision (95%CI).

Discussion

In other works in which pharmaceutical care is discharged by the pharmacy service¹⁸⁻²¹ by means of the unit dose dispensation system, the number of interventions carried out per every 100 patients (which oscillates between 4 and 22) is concordant with the number obtained in our study (8). The disparity of results between distinct authors may be due to the fact that the reach of the PI depends on factors such as: the characteristics of the centre, the number of pharmacists involved, their level of specialisation, the established pharmaceutical care model, the documentation methodology used, as well as the total time dedicated to the development of this activity.²² In this case, as there was only one pharmacist in the centre, his presence in the clinical unit is difficult given that the demands of other activities increase every day. In this respect, being able to add computerised clinical histories has put a greater amount of patient's clinical information at our disposal and has enabled optimum monitoring from the pharmacy service.

Variability in the number of PIs observed between the different periods evaluated may be explained by the lesser number of interventions carried out during January and February, coinciding with the implantation of the pharmaceutical care programme and, during July and August, when care activity and the number of patients admitted to the hospital diminished by 38.3%.

With regard to the suitability of the PI; in studies with similar sets of values^{5,23,24} marking grades vary a great deal, which makes it difficult to establish comparisons. Nonetheless, published results^{25,26} show that 9 out of every 10 interventions carried out are considered "important"

CENTRO DE RECUPERACIÓN Y REHABILITACIÓN DE LEVANTE Servicio de Farmacia		Apellidos _____ Nombre _____		
Servicio _____ Cama _____	N°/proceso _____ Edad (a-aos) _____			
Dr. _____ Hoja n°/4 _____	Fecha Ingreso: _____ Fecha alta: _____			
Diagnóstico ingreso: _____ asociado al PRM: _____				
Otras patologías: I. Renal I. Hepática I. Cardíaca Diabetes Asma/EPOC HTA Otro: _____ No se conocen				
1. IDENTIFICACIÓN DEL PROBLEMA RELACIONADO CON LA MEDICACIÓN (PRM): Fecha: _____				
Medicamento implicado (posología, v'a): _____ Profesional implicado: ☐ M ☐ E ☐ F Fuente: 1.1. Observación directa: ☐ Validación preparación/dispensación ☐ Validación administración 1.2. Monitorización farmacoterapéutica: ☐ Validación prescripción electrónica ☐ Revisión datos analíticos 1.3. Revisión Historia Clínica: ☐ Hoja de evolución médica ☐ Hoja de enfermería				
2. ORIGEN DEL PRM				
2.1. POR Error de Medicación (EM)?? ☐ Potencial ☐ Real Personal implicado: ☐ M ☐ E ☐ F				
2.2. POR características: ☐ Paciente ☐ Medicamento ☐ Enfermedad				
2.3. DESCRIPCIÓN DEL EM				
01. Dosis ☐ omitida ☐ duplicada ☐ errónea 02. Medicamento ☐ omitido ☐ erróneo 03. Horario 04. Intervalo posológico ☐ omitido ☐ erróneo 05. V'a administración ☐ IV ☐ oral ☐ errónea 06. Velocidad administración 07. Método administración 08. Condiciones preparación 09. Duplicidad 10. Duración tratamiento 11. Especialidad no incluida en GFT 12. Dificultades de interpretación para la 13. Otras				
3. DESCRIPCIÓN DEL PRM (Marcar una opción) ☐ Potencial ☐ Real				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px; vertical-align: top;"> o INDICACIÓN 1. Necesidad de tratamiento adicional 1.1. Indicación no tratada 1.2. Continuación de tratamiento 1.3. Tratamiento combinado (sinergismo) 1.4. Tratamiento profiláctico o premedicación 2. Medicamento innecesario 2.1. No indicado 2.2. Alternativa más coste-efectiva 2.3. Duración inadecuada 2.4. V'a de administración alternativa 2.5. Adicción / ingesta accidental o intencionada 2.6. Duplicidad terapéutica o EFECTIVIDAD 3. Medicamento inadecuado 3.1. No indicado para la situación 3.2. No efectivo para la indicación prescrita / resistencia 3.3. Forma de dosificación inapropiada 3.4. Otro medicamento más efectivo 4. Infradosificación 4.1. Dosis / intervalo posológico 4.2. Duración inadecuada 4.3. Administración inadecuada 4.4. Interacciones con fármacos y/o alimentos 4.5. Conversiones de v'a o formulación incorrectas </td> <td style="width: 50%; padding: 5px; vertical-align: top;"> o SEGURIDAD 5. Reacción adversa 5.1. Alergia 5.2. Administración inadecuada 5.3. Efecto adverso 5.4. Contraindicado por factores de riesgo 5.5. Interacción con fármacos y/o alimentos 6. Sobredosificación 6.1. Dosis / intervalo inadecuado 6.2. Duración inadecuada 6.3. Administración inadecuada 6.4. Interacciones con fármacos y/o alimentos 6.5. Conversiones de v'as o formulación incorrectas 6.6. Duplicidad o ADHERENCIA 7. Incumplimiento 7.1. Falta de adherencia a recomendaciones 7.2. Dificultades de administración 7.3. Motivos económicos 7.4. Falta de comprensión 7.5. Otras: </td> </tr> </table>			o INDICACIÓN 1. Necesidad de tratamiento adicional 1.1. Indicación no tratada 1.2. Continuación de tratamiento 1.3. Tratamiento combinado (sinergismo) 1.4. Tratamiento profiláctico o premedicación 2. Medicamento innecesario 2.1. No indicado 2.2. Alternativa más coste-efectiva 2.3. Duración inadecuada 2.4. V'a de administración alternativa 2.5. Adicción / ingesta accidental o intencionada 2.6. Duplicidad terapéutica o EFECTIVIDAD 3. Medicamento inadecuado 3.1. No indicado para la situación 3.2. No efectivo para la indicación prescrita / resistencia 3.3. Forma de dosificación inapropiada 3.4. Otro medicamento más efectivo 4. Infradosificación 4.1. Dosis / intervalo posológico 4.2. Duración inadecuada 4.3. Administración inadecuada 4.4. Interacciones con fármacos y/o alimentos 4.5. Conversiones de v'a o formulación incorrectas	o SEGURIDAD 5. Reacción adversa 5.1. Alergia 5.2. Administración inadecuada 5.3. Efecto adverso 5.4. Contraindicado por factores de riesgo 5.5. Interacción con fármacos y/o alimentos 6. Sobredosificación 6.1. Dosis / intervalo inadecuado 6.2. Duración inadecuada 6.3. Administración inadecuada 6.4. Interacciones con fármacos y/o alimentos 6.5. Conversiones de v'as o formulación incorrectas 6.6. Duplicidad o ADHERENCIA 7. Incumplimiento 7.1. Falta de adherencia a recomendaciones 7.2. Dificultades de administración 7.3. Motivos económicos 7.4. Falta de comprensión 7.5. Otras:
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4. INTERVENCIÓN FARMACÉUTICA (Marcar una opción de cada ítem) ☐ Prevención ☐ EM ☐ PRM Resolución: ☐ EM ☐ PRM				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px; vertical-align: top;"> * 5.1. Intervención farmacéutica: 5.01. o Iniciar medicamento. 5.02. o Suspendir medicamento por no encontrarse indicado. 5.03. o Suspendir medicamento por duración de tratamiento. 5.04. o Suspendir medicamento. 5.05. o Modificar v'a de administración. 5.06. o Modificar posología. 5.07. o Modificación de forma farmacéutica. 5.08. o Cambiar a medicamento más efectivo. 5.09. o Cambiar a medicamento más seguro. 5.10. o Cambiar a medicamento más eficiente. 5.11. o Cambiar a medicamento incluido en la GFT. 5.12. o Iniciar monitorización farmacocinética. 5.13. o Suspendir monitorización farmacocinética. </td> <td style="width: 50%; padding: 5px; vertical-align: top;"> * 5.2. Intervención farmacéutica preventiva de: o Reacción alérgica. o Fallo de tratamiento. o Efectos adversos. o Interacciones. o Clarificar prescripción. o Clarificar preparación/dispensación. o Clarificar administración. * 5.3. Comunicación equipo asistencial: - Interconsulta realizada entre: o Farmacéutico-Médico. o Farmacéutico-Enfermería. o Farmacéutico-Personal Farmacia. - Método de Interconsulta: o Verbal. o Historia Clínica informatizada. </td> </tr> </table>			* 5.1. Intervención farmacéutica: 5.01. o Iniciar medicamento. 5.02. o Suspendir medicamento por no encontrarse indicado. 5.03. o Suspendir medicamento por duración de tratamiento. 5.04. o Suspendir medicamento. 5.05. o Modificar v'a de administración. 5.06. o Modificar posología. 5.07. o Modificación de forma farmacéutica. 5.08. o Cambiar a medicamento más efectivo. 5.09. o Cambiar a medicamento más seguro. 5.10. o Cambiar a medicamento más eficiente. 5.11. o Cambiar a medicamento incluido en la GFT. 5.12. o Iniciar monitorización farmacocinética. 5.13. o Suspendir monitorización farmacocinética.	* 5.2. Intervención farmacéutica preventiva de: o Reacción alérgica. o Fallo de tratamiento. o Efectos adversos. o Interacciones. o Clarificar prescripción. o Clarificar preparación/dispensación. o Clarificar administración. * 5.3. Comunicación equipo asistencial: - Interconsulta realizada entre: o Farmacéutico-Médico. o Farmacéutico-Enfermería. o Farmacéutico-Personal Farmacia. - Método de Interconsulta: o Verbal. o Historia Clínica informatizada.
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5. ACEPTACIÓN DE LA INTERVENCIÓN FARMACÉUTICA				
o 1. Aceptada 1.1. Sin modificación 1.2. Con modificación o 2. No aceptada con justificación facultativa o 3. Caso omiso por traslado, alta, exitus, no lectura etc.		Comentarios 		
6. IDONEIDAD DE LA INTERVENCIÓN FARMACÉUTICA				
1. Minimización de costes sin afectar la efectividad del tratamiento. 2. Inapropiada para el cuidado del paciente. 3. Sin importancia para el cuidado del paciente. 4. Importante, con mejora del cuidado del paciente. 5. Muy importante: evita cambios en el paciente (analíticos etc) que requieren tratamiento adicional y/o aumento de la monitorización, RAM grave, fallo de tratamiento.				

Figura 3 Individual form for pharmacotherapeutic monitoring.

Table 1 Suitability of the pharmaceutical interventions (PI) carried out

Suitability of the PI	Pharmaceutical interventions (2007), No. (%)							
	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	Total	
							No. (%)	95%CI
Important, resulting in improvement in patient care: a pharmaceutical intervention which improves the quality of patient care (recommendations based on practical medical care benchmarks, protocols or guidelines) including aspects relating to the quality of life or comfort	22 (84.7)	33 (34)	25 (25)	12 (21.8)	53 (49.5)	15 (16.7)	160 (33.7)	9.3-58.0
Very important: avoids allergic reaction, severe ADR, or treatment failure. Pharmaceutical intervention which avoids alterations in the patient (analytical, for instance) which require additional treatment and/or an increase in monitoring, a severe ADR or treatment failure	2 (7.7)	10 (10.3)	53 (53)	24 (43.6)	34 (31.8)	66 (73.3)	189 (39.80)	17.7-62.2
Without importance for patient care: pharmaceutical intervention which does not produce significant alterations in patient care	1 (3.8)	44 (45.4)	13 (13)	13 (23.6)	18 (16.8)	9 (10)	98 (20.6)	
Cost minimisation without affecting the effectiveness of the treatment: the pharmaceutical intervention improves cost effectiveness	1 (3.8)	10 (10.3)	9 (9)	6 (11)	2 (1.9)	0	28 (5.9)	
Total No. of pharmaceutical interventions	26	97	100	55	107	90	475	

or “very important”; similar data to those obtained in this study (7 out of every 10 interventions).

The percentage of accepted PIs is in concordance with other studies^{9,27-29} in which PI took place on the basis of the monitoring of the medical prescription in the SIDIM (between 49% and 88%) and less than that of other published works^{30,31} in which the pharmacist was located in the clinical unit (95%-99%). This demonstrates that, even when a computerised clinical history is available, and consequently, more patient information, the intervention of the pharmacist is more accepted the more he or she is integrated into the care team.

The objective of implanting quality indicators in pharmaceutical care is to measure the benefits, both clinical and economic, of PIs in patients.²¹ In this study, the degree of acceptance has allowed us to measure the added value of the pharmacist as an integral part of the

Table 2 Statistical analysis of the suitability of pharmaceutical interventions (PI) carried out during 2007

Suitability of the PI	Average (SD)	95%CI	Interval
Important	26.66 (14.89)	14.75-38.57	12-53
Very important:	31.5 (24.68)	11.77-51.23	2-66
Without importance	16.33 (14.69)	4.59-28.07	1-44
Cost minimisation	4.66 (4.27)	1.24-8.07	0-10
CI indicates confidence interval; SD, standard deviation.			

multidisciplinary team attending to the patient and his or her suitability, and to measure the clinical significance of the PI in patients.

Table 3 Level of acceptance of the pharmaceutical interventions (PI) carried out

Acceptance of the PI	Pharmaceutical interventions (2007), No. (%)							
	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	Total	
							No. (%)	95%CI
Accepted	24 (92.3)	65 (67)	79 (79)	26 (47.3)	82 (76.7)	69 (76.6)	345 (72.6)	64.7-80.5
Not accepted with facultative justification	0	2 (2.1)	9 (9)	5 (9.1)	21 (19.6)	9 (10)	46 (9.7)	
Case disregarded (due to discharge, not read or not received)	2 (7.7)	30 (30.9)	12 (12)	24 (43.6)	4 (3.7)	12 (13.4)	84 (17.7)	
Total no. of pharmaceutical interventions	26	97	100	55	107	90	475	

Table 4 Statistical analysis of the level of acceptance of pharmaceutical interventions (PI) carried out during 2007

Acceptance of the PI	Average (SD)	95%CI	Interval
Accepted	57.5 (25.94)	36.75-78.25	24-82
Not accepted	7.66 (7.47)	1.69-13.63	0-21
Case disregarded	14 (11.02)	5.18-22.82	2-30
Total PI	79.16 (31.79)	53.72-104.60	26-107

CI indicates confidence interval; SD, standard deviation.

Furthermore, the results obtained have allowed us to establish benchmarks for these indicators; $\geq 85\%$ for the acceptance of the PI and $\geq 70\%$ for the "important" and "very important" PI. However, there is still a long road ahead of us, and we must therefore direct our efforts to the elaboration of indicators which quantify the repercussion of pharmaceutical care on costs, satisfaction and quality of life of patients.

Even though it is necessary to evaluate the clinical significance of the PI according to the scale of evaluation of patient suitability²⁷ during pharmacotherapeutic monitoring of the patient, it would be appropriate if its classification as "important" or "very important" were to be evaluated by other health care professionals.^{28,31}

In any case, it would be recommendable for adjustments to be made for generalities in the results, which would allow a more accurate evaluation and therefore a fair comparison between hospitals.³¹

Thus, and given the commitment of the professionals involved, it has been possible to improve the level of implication of staff members in the pursuit of a common objective: minds and attitudes dedicated to working towards quality and continuous improvement.

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References

- Otero MJ. Mejora de la seguridad de la utilización de los medicamentos en el ámbito hospitalario. *Todo Hospital*. 2005;221: 623-32.
- Climente Martí M, Jiménez Torres NV, editors. *Manual para la atención farmacéutica*. 3rd ed. Valencia: Hospital Universitario Dr. Peset; 2005.
- Herrera Carranza J, editor. *Manual de farmacia clínica y atención farmacéutica*. 1st ed. Madrid: Elsevier España; 2003.
- Molero R, Acosta M, editors. *Planificación y organización de un servicio de farmacia*. Madrid: Farmacia Hospitalaria; 2006. p. 3-28.
- Márquez Peiró J, Pérez Peiró C, Carmena-Carmena J, Jiménez Torres NV. Identificación de oportunidades de mejora del tratamiento de la hepatitis C. *Farm Hosp*. 2006;30:154-60.
- Valvanera Valero M. Cerca de 50 países piden impulsar la notificación del error de medicación. *Archivo Farmacología* [accessed Apr 16, 2007]. Available from: www.correofarmaceutico.com
- Vaillo M. La prescripción electrónica, espejo de colaboración entre sanitarios. *Archivo Gestión* [Accessed Apr 30, 2007]. Available from: www.correofarmaceutico.com
- Jiménez NV, Climente M, Font I, Ordóvaz JP. Formación clínica para el cuidado farmacéutico. *Cienc Pharm*. 1996;6:29-43.
- Winterstein AG, Hatton RC, Gonzalez-Rothi R, Johns TE, Segal R. Identifying clinically significant preventable adverse drug events through a hospital's database of adverse drug reaction reports. *Am J Health Syst Pharm*. 2002;59:1742-9.
- Peiró S. Atención farmacéutica en el entorno hospitalario: la hora de las decisiones. *Farm Hosp*. 2006;30:325-7.
- Tulip S, Campbell D. Evaluating pharmaceutical care in hospital. *Hospital Pharmacist*. 2001;8:275-9.
- Castillo Romero I, Martínez Hernández A, Martínez H, Suárez ML, Pequena Caturla T. Atención farmacéutica a pacientes ingresados desde la unidad clínica. *Farm Hosp*. 2000;24:27-31.

13. Cavero Rodrigo E, Climente Martí M, Navarro Fontestad MC, Jiménez Torres NV. Evaluación de la calidad de dos modelos de atención farmacéutica en pacientes onco-hematológicos. *Farm Hosp.* 2007;31:231-7.
14. Gorgas Torner MQ, Odena Estradé E, Pastor Solernou F. Atención farmacéutica en los problemas relacionados con los medicamentos en enfermos hospitalizados. *Farm Hosp.* 2003;27:280-9.
15. Arroyo Conde C,iquerreta I, Ortega Eslava A, Goñi Zamarbide O, Giráldez Deiró J. Impacto clínico y económico de la incorporación del farmacéutico residente en el equipo asistencial. *Farm Hosp.* 2006;30:284-90.
16. Pangel Mayoral JF, Fernández JL, Liso Rubio FJ. Estado actual de la investigación en atención farmacéutica. *Farm Hosp.* 2005;29:335-42.
17. Gaspar M, Díaz-Jorge B, Ponce A. Programa de etiquetado como fase previa a la dispensación por dosis unitarias: estudio de minimización de costes. *Aten Farm.* 2006;8:180-8.
18. Durán E, Santolalla R, Hervás G, Pérez MT, López MJ, Luque R. Problemas relacionados con la medicación: detección y resolución. Comunicación XLI Congreso SEFH; 1996.
19. Baldominos G, Suárez ML, Martínez H, Santolalla R, Requena T. Programa integral de intervenciones farmacéuticas en el área de dispensación. Comunicación XLIII Congreso SEFH; 1998.
20. Obaldía MC, Coloma R, González L, Alfaro A, Torregrosa N, Folch N, et al. Intervención del farmacéutico en la terapéutica hospitalaria a través del sistema de distribución de medicamentos en dosis unitarias. *Farm Hosp.* 1995;19:80-5.
21. Leape LL, Cullen DJ, Clapp MD, Burdick E, Demonaco HJ, Ericsson JI, et al. Pharmacist participation on physician rounds and adverse drug events in the intensive unit care. *JAMA.* 1999;282:267-70.
22. Barber ND, Batty R, Ridout DA. Predicting the rate of physician-accepted intervention by hospital pharmacist in the United Kingdom. *Am J Health-Syst Pharm.* 1997;54:397-405.
23. Climente M, Jiménez NV. Impacto clínico y farmacoeconómico de las actuaciones farmacéuticas en pacientes hospitalizados. *Aten Farm.* 2002;4:222-36.
24. Mutnik AH, Sterba KJ, Peroutka JA, Sloan NE, Beltz EA, Sorenson MK. Cost savings and avoidance from clinical interventions. *Am J Health Syst Pharm.* 1997;54:392-6.
25. Farré R, Clopés A, Sala ML, Castro I, Gámez M, López S, et al. Intervenciones farmacéuticas (parte I): metodología y evaluación. *Farm Hosp.* 2000;24:136-44.
26. Campany D, Grau S, Monterde J, Salas E, Carmona A, Marin M, et al. Análisis de las intervenciones farmacéuticas realizadas a través del sistema informatizado de dispensación en dosis unitaria. *Farm Hosp.* 1998;22:11-5.
27. Brawn BL, Williamson SE. A system for documentation of pharmacist interventions with incorporation into performance and quality improvement plans. *Hosp Pharm.* 1993;28:1083-8.
28. Brown G. Assessing the clinical impact of pharmacists' intervention. *Am J Hosp Pharm.* 1991;48:2644-7.
29. Quenca ML, Aguilar T, Desongles T, Hathiramani M, Rábano AL. Cambios en la terapéutica tras la intervención del farmacéutico. *Farm Clin.* 1998;15:76-82.
30. Carmona PM, García E, La Cruz P, Font Noguera I. Evaluación de un programa de atención farmacéutica en unidades de hospitalización con dispensación individualizada de medicamentos en dosis unitarias. *Farm Hosp.* 2001;25:156-63.
31. Wright J, Hill PP, editors. *Gobierno clínico*. Madrid: Elsevier España; 2006.
32. Gaspar M, Romero I, Caja M. Implantación de un programa de atención farmacéutica en un hospital de traumatología. *Aten Farm.* 2009 [in press].

Appendix 1 Glossary of terms

Acceptance of PI: the doctor approves the proposal made by the pharmacist for the prevention of resolution of the MRP, either without making any modification to the recommendation or with a minor modification.

ME: medication error. Any preventable action which may cause harm to the patient (pharmacotherapeutic morbidity or a negative result associated with the use of medicines) or bring about an inappropriate use of medicines when said medicines are under the control of health care professionals or the patient him or herself. Such action may be related to procedures, professional practice, the medicine and the systems, including mistakes in prescription, communication or in the monitoring of the evolution of the patient. That is to say, an ME is an incorrect use of medicines.

Potential ME: circumstances or events which have the capacity to cause error.

Real ME: when the error has occurred, in any of the phases of usage of the medicines.

MRP: a medication related problem. These are situations which cause or are capable of giving rise to a negative result in relation to the use of medicines (NRM). MRPs are elements of the process which imply a greater risk of the patient suffering an NRM, the consequences thereof must have a causal effect with pharmacotherapy. This NRM may also be called pharmacotherapeutic morbidity (PTM). Thus, MRPs may be divided into:

—Potential or unmanifested MRP: the patient may come to experience an undesirable event (NRM) which may interfere in the desired results.

—Real MRP: the patient experiences an undesirable event related to pharmacotherapy (NRM) which interferes or may interfere in the desired results.

Thus, a MRP may be due to an ME, characteristics of the patient or characteristics of the medicine. That is, not all MRPs have their origin in MEs.

Pharmaceutical intervention (PI): an action taken by the pharmacist to prevent or resolve a MRP or a need for care on the part of a patient, by means of the optimisation of the pharmacotherapeutic treatment.

EP: electronic prescription. New technology which allows the doctor to use a computer programme to directly prescribe treatment by means of an electronic device (a computer, a PDA), thereby avoiding transcription both by the pharmacist and by the nurse and, therefore, the sources of the error. It increases security and the efficiency of the use of medicines.

PTM: pharmacotherapeutic morbidity. Resulting in the non-existent, negative or less than optimum clinical effect of the patient's pharmacotherapy. That is, the NRM. Derived from a mistake in treatment or an adverse event.