



Original article

Factors that influence interdepartmental referrals between Surgical Departments and Internal Medicine

Eduardo Montero Ruiz,* Laura Pérez Sánchez, Cristina Gómez Ayerbe,
José María Barbero Allende, Marta García Sánchez, Joaquín López Álvarez

Servicio de Medicina Interna, Hospital Universitario Príncipe de Asturias, Alcalá de Henares, Madrid, Spain

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Introduction: To analyse the long term outcome of the age and comorbidity of patients admitted to Surgical Departments, the number of referrals to Internal Medicine made by these Departments, and to assess whether there are seasonal variations and the call/reject effect.

Material and methods: We compared the age, Charlson Comorbidity Index (CCI), and the number of referrals made by Traumatology, General Surgery and Urology of patients discharged in 2000, with those discharged in 2007. Seasonal variations and the call/reject effect were studied by analysing all the interdepartmental referrals made by all the surgical departments from the year 2000 to 2007.

Results: Age increased by 5.6% between 2000 and 2007, the CCI by 5.8%, and interdepartmental referrals by 60%. Interdepartmental referrals decreased in July and August, whilst they increased in January, February, June and October, up to 64% more in January, although with variations of almost 50% in the same month. We detected differences of up to 68.2% in the referrals requested to different physicians.

Conclusions: We observed a sharp increase in the requests for referral to Internal Medicine by Surgical Departments of our hospital, which is not explained by the increase in admissions to these Departments, and which could be associated with the increase in age and comorbidity of their patients. Requests for interdepartmental referral have marked monthly variations and also as regards the Consulting Physician.

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Factores que influyen en la solicitud de interconsultas a medicina interna por los servicios quirúrgicos

R E S U M E N

Objetivo: Analizar la evolución de la edad y la comorbilidad de los pacientes ingresados en los servicios quirúrgicos, el número de interconsultas pedidas por dichos servicios a medicina interna y valorar la existencia de variaciones estacionales y efecto llamada/rechazo en su solicitud.

Palabras clave:

Atención perioperatoria

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*Corresponding author.

E-mail address: emontero.hupa@salud.madrid.org (E. Montero Ruiz).

Pacientes ingresados
Medicina interna

Material y métodos: Comparamos la edad, el índice de comorbilidad de Charlson (ICh) y el número de interconsultas solicitadas de los pacientes dados de alta en 2000 con los de 2007, de traumatología, cirugía general y urología. Estudiamos las variaciones estacionales y el efecto llamada/rechazo analizando todas las interconsultas solicitadas por todos los servicios quirúrgicos del hospital desde 2000 hasta 2007.

Resultados: Entre 2000 y 2007 la edad aumentó el 5,6%; el ICh, el 5,8% y las interconsultas, el 60%. En julio y agosto se reduce la solicitud de interconsultas, mientras que en enero, febrero, junio y octubre se incrementan, hasta un 64% más en enero, aunque con variaciones dentro de un mismo mes de hasta casi el 50%. Detectamos diferencias que alcanzan el 68,2% en la solicitud de interconsultas a los diferentes internistas.

Conclusiones: Observamos un fuerte ascenso en la solicitud de interconsultas a medicina interna por los servicios quirúrgicos de nuestro hospital, que no se explica por el aumento de ingresos en dichos servicios, y que puede estar en relación con el incremento de la edad y la comorbilidad de sus enfermos. La petición de interconsultas presenta marcadas variaciones mensuales y también con respecto al internista consultor.

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Introduction

One of the duties of departments of internal medicine is giving support to other hospital departments, providing their specific knowledge and skills. This is usually performed through interdepartmental referrals, resulting in a high work load,^{1–3} even for duty doctors.⁴ Of all the interdepartmental referrals made to internal medicine, those requested by surgical departments are particularly significant, due to their number and complexity and also because a great deal of time and dedication is needed.^{1,2} Despite the significance of these referrals, we know little about their general characteristics and the aspects and situations that can influence how they are requested and carried out. Clarifying these matters is fundamental when planning the work of a department of internal medicine and the referrals themselves.

This study aims to analyse the evolution of the age and comorbidities of patients admitted to surgical departments, the number of referrals made by these departments to internal medicine, and assess whether requests were subject to seasonal variations and the call/reject effect.

Materials and methods

The 550-bed Principe de Asturias University Hospital provides health care for an almost exclusively urban population of 375 000 inhabitants. It is an accredited centre for training resident physicians. The medical specialities covered by the hospital which function independently of the department of internal medicine are: Allergy, Cardiology, Digestive Medicine, Endocrinology, Haematology, Nephrology, Pneumology, Neurology, Medical Oncology, Psychiatry, and Rheumatology. The surgical area is composed of the following departments: General and Digestive Surgery (GDS), Oral and Maxillofacial Surgery, Orthopaedic Surgery and Traumatology (OST), Dermatology, Gynaecology and Obstetrics, Ophthalmology, Otorhinolaryngology, and Urology (URO).

In our hospital, a rotation system is used in internal medicine to allocate each month a physician to exclusively deal with interdepartmental referrals. Depending on the characteristics of the consulting internist, this organizational model can lead to distortions in the number of interdepartmental referrals by the surgical departments, as they are aware of the doctors' particular traits. This can result in more (call effect) or less (reject effect) referral requests than are necessary.

Since 1999, our department has kept records of the emergency and non-emergency interdepartmental referral requests made during working hours, excluding those referred to the unit of infectious diseases. The variables recorded include the department making the request, the date, and the consulting internist. We obtained the rest of the data from the Minimum Basic Set of Hospital Data (MBSD) provided by the Department of Admissions and Clinical Documentation at the hospital.

To study the differences with regard to age and comorbidity, we compared all the patients discharged in 2000 with those discharged in 2007 aged 15 or over from the three surgical departments requesting the most interdepartmental referrals: OST, GDS, and URO. The variables analysed were age, sex, and the Charlson Comorbidity Index⁵ (CCI), which was validated for use with administrative databases similar to the MBSD.⁶ We analysed the time variations in requests for interdepartmental referrals by comparing the requests made by these three departments in 2000 with those from 2007.

We studied seasonal variations by analysing the number and month of requests for interdepartmental referrals made from January 2000 until December 2007 by all the surgical departments in the hospital. We looked into the possible call/reject effect by analysing the number of interdepartmental referrals made to each consulting internist by all the hospital's surgical departments during each month between January 2000 and December 2007. This analysis only included the doctors who worked as consulting internists for 3 months during the period of the study.

Statistical analysis

Age and CCI scores are expressed as means with 95% confidence intervals (CI). The comparison of means was performed with the student t test. Sex-divided and interdepartmental referrals are expressed as a number and percentage. We used the chi-square test to compare proportions.

The requests for interdepartmental referrals made by month and to each internist are expressed as monthly means and ranges, as we think that this is the clearest way to show the variations. The student t test was used to compare the means with the overall mean, with a 95% CI. To study the possible call/reject effect, we used linear regression to compare means with the overall mean with a 95% CI. These were adjusted by years and natural months to control the possible effects caused by the different periods considered in the study. Statistical significance was set at $P < .05$. The statistical analyses were performed with the Statistical Package for the Social Sciences (SPSS 15.0; SPSS Inc.; Chicago, Illinois, USA).

Results

In 2000, 7015 patients were admitted for surgery to our hospital, and 7510 in 2007. Of these 66.3% and 75.1%, respectively, were admitted to the OST, GDS and URO departments. The results

(Table 1) show that there were no variations with regard to sex, while the mean age increased by 5.6% and CCI scores by 5.8%, with differences between the three departments. The OST department showed the greatest changes, with increases of 10.3% in the age of patients and 25.8% in CCI scores. In the GDS department, there was also a 2.4% increase in age, but a non-significant decrease in the CCI score of 2.5%. In the URO department, the mean age increased by 5.9%, and there was a non-significant increase in the CCI score of 6.8%.

Looking at the evolution over time of the three surgical departments studied individually, we observed that, while the total number of admissions increased by 21.4% between 2000 and 2007, the number of interdepartmental referrals rose by 60% (Figure). The increase in the number of requests for interdepartmental referrals made by the OST department was slightly, but not significantly, higher than the admissions to this department (Figure). The number of requests for interdepartmental referrals made by the GDS department increased by 104.5%, while admissions rose by 16% (Figure). The percentage of patients admitted to this department for whom an interdepartmental referral is requested almost doubled (Table 1). Although to a lesser extent, similar figures were found for the URO department (Figure). In this case, despite the sharp increase in interdepartmental referrals, this did not reach statistical significance due to the relatively low number of interdepartmental referrals during both years.

Table 1 – Results

	2000	2007	Difference	P
OST				
No.	1424	1.793		
Age, mean (95% CI)	50.3 (49.2-51.4)	55.5 (54.5-56.5)	5.2 (3.7-6.7)	<.001
Women, No. (%)	758 (53.3)	964 (53.8)		NS
CCI, mean (95% CI)	1.63 (1.53-1.73)	2.05 (1.95-2.15)	0.42 (0.28-0.56)	<.001
Interdepartmental referrals, No. (%)	108 (7.58)	139 (7.75)		NS
GDS				
No.	2397	2780		
Age, mean (95% CI)	53.6 (52.8-54.3)	54.9 (54.2-55.6)	1.3 (0.3-2.3)	0.01
Women, No. (%)	1083 (45.2)	1205 (43.3)		NS
CCI, mean (95% CI)	2.41 (2.27-2.54)	2.34 (2.23-2.45)	-0.06 (-0.24-0.11)	NS
Interdepartmental referrals, No. (%)	67 (2.8)	137 (4.93)		<.001
URO				
No.	827	1.068		
Age, mean (95% CI)	57.4 (56-58.8)	60.8 (59.7-61.9)	3.4 (1.6-5.1)	<.001
Women, No. (%)	179 (21.7)	247 (23.1)		NS
CCI, mean (95% CI)	2.79 (2.61-2.97)	2.98 (2.83-3.13)	0.19 (-0.04-0.42)	NS
Interdepartmental referrals, No. (%)	30 (3.63)	52 (4.87)		NS
Total				
No.	4648	5641		
Age, mean (95% CI)	53.2 (52.7-53.8)	56.2 (55.7-56.7)	3 (2.2-3.7)	<.001
Women, No. (%)	2020 (43.5)	2416 (42.8)		NS
CCI, mean (95% CI)	2.24 (2.15-2.32)	2.37 (2.3-2.44)	0.13 (0.02-0.24)	0.02
Interdepartmental referrals, No. (%)	205 (4.41)	328 (5.81)		0.002

CCI indicates Charlson comorbidity index; CI, confidence interval; GDS, General and Digestive Surgery; NS, not significant; OST, Orthopaedic Surgery and Traumatology; URO, Urology.

Patients
Interdepartmental
referrals

OST GDS URO Total

Figure 1 – Increases in patients and interdepartmental referrals in 2007 in relation to 2000. GDS, General and Digestive Surgery; OST, Orthopaedic Surgery and Traumatology; URO, Urology.

Regarding possible seasonal variations, we observed that there were quite pronounced differences in requests for interdepartmental referrals between the different months of the year (Table 2). In January, February, June and October we received more interdepartmental referrals. On the other hand, in July and August requests decreased significantly. In January, the surgical departments requested 64% more interdepartmental referrals than in August. Overall, large variations were seen during the same month which, in some cases, reached nearly 50%.

The participating internists did consulting work for a mean of 4.7 (3-9) months over the study period. The requests for interdepartmental referrals varied considerably between consulting internists, and there were even important variations for the same internist (Table 3). There were clear tendencies for both the call effect and the reject effect, the latter being demonstrated in the difference in interdepartmental referral requests made to internists 4 and 7 of 68.2%.

Discussion

The results obtained show several aspects that influence the requests for interdepartmental referrals made to internal

medicine by surgical departments. There was a large increase in the number of requests for interdepartmental referrals between 2000 and 2007. This increase can not be justified merely by the higher number of admissions. One explanation for it is that the patients admitted to surgical departments in 2007 were older and had more complex diseases. These findings reinforce the idea that nowadays it is possible for older patients with more comorbidity to undergo surgery. This is probably all due to increased life expectancy and quality of life among the population and the improvements in the surgical and anaesthetic procedures and techniques.

We observed that traumatologists made a lot of requests for interdepartmental referrals, probably because they are aware of their limitations in managing pathologies from outside of their speciality. However, both general surgeons and urologists made more requests for interdepartmental referrals over the study period. An explanation for this phenomenon may be that, while they manage some clinical pathologies better than traumatologists, they are not able to overcome the modest increases in age and, above all, comorbidities of their patients. Comorbidity is a more important factor than age when assessing the risk of perioperative complications.⁷ Other possible causes of the increase in interdepartmental referrals by general surgeons or urologists could be the

Table 2 – Requests for interdepartmental referrals by month

Month	Mean (range)	Mean differences (95% CI)	P
January	31 (22-45)	4.98 (3.58 to 6.38)	<.001
February	28.2 (21-33)	2.2 (0.8 to 3.6)	.002
March	26.2 (15-39)	0.2 (-1.17 to 1.63)	NS
April	24.6 (16-34)	-1.39 (-2.79 to 0.01)	NS
May	25.6 (16-36)	-0.39 (-1.79 to 1.01)	NS
June	30.6 (16-39)	4.61 (3.21 to 6.01)	<.001
July	21.4 (13-30)	-4.64 (-6.04 to -3.24)	<.001
August	18.9 (11-26)	-7.12 (-8.72 to -5.72)	<.001
September	25.7 (16-32)	-0.27 (-1.67 to 1.13)	NS
October	29.1 (21-36)	3.11 (1.71 to 4.51)	<.001
November	26.1 (21-34)	0.11 (-1.29 to 1.51)	NS
December	24.6 (19-30)	-1.39 (-2.79 to 0.01)	NS
Total	26 (11-45)		

CI indicates confidence interval; NS, not significant.

Table 3 – Requests for interdepartmental referrals per month to the different internists

Internist	Mean (range)	Adjusted difference (95% CI)	P
1	22 (16-45)	-2.25 (-6.82-2.31)	NS
2	23.7 (21-27)	-4.79 (-11.73-2.14)	NS
3	28.2 (23-33)	2.02 (-4.03-8.06)	NS
4	31.7 (22-39)	4.96 (-2.01-11.94)	NS
5	23.2 (14-30)	-0.39 (-6.76-5.99)	NS
6	31 (26-36)	2.34 (-3.21-7.89)	NS
7	21 (19-23)	-7.67 (-14.43 to -0.91)	.03
8	29.5 (22-39)	1.49 (-3.03-6.02)	NS
9	26.7 (19-37)	3.13 (-3.87-10.13)	NS
10	26.4 (16-36)	1.21 (-3.58-6)	NS
11	24.8 (14-35)	-1.22 (-6.26-3.81)	NS
12	23.6 (16-32)	-3.0 (-8.46-2.47)	NS
13	28.8 (24-36)	-1.39 (-2.79-0.01)	NS
Total	26.2 (14-45)		

CI indicates confidence interval; NS, not significant.

pressure exerted on them due to waiting lists, or their inferior training in general medical as a consequence of progressively increasing specialisation. This all results in these departments requiring a greater control of their patients by doctors from the department of internal medicine. Skill and experience in managing medical pathologies in patients requiring surgery are clearly beneficial in terms of the quality and cost of the healthcare given.⁸ Doctors' ability and training have a greater influence on the results achieved with this kind of patients than the hospital's characteristics and equipment.⁹ In fact, mortality among surgical patients is not so much due to the onset of complications but to the doctors' ability to recognise and treat them at the earliest time.¹⁰

There are marked differences in the number of interdepartmental referrals requested by the surgical departments in the different months of the year. A justification for this finding could be the increase or decrease in general activity in these departments, possibly coinciding with holiday periods. However, months in which people traditionally take holidays, such as December, January and April, showed no decrease in the number of interdepartmental referrals. Another possible explanation is that the months with the highest number of interdepartmental referrals are often those with the highest levels of morbidity and the months with the least interdepartmental referrals are those when there is less medical morbidity.

The results showed tendencies for and against making requests for interdepartmental referrals to certain doctors, the rejection reaching statistical significance in some cases. These findings could be because the consulting doctor was too lax or too strict when making interdepartmental referrals. They could also be due to how the doctor dealt with them, or because the internist hindered the surgeon's usual work. Another reason could be that the surgeons' expectations about interdepartmental referrals, often different to those of the consulting internist, are not fulfilled.¹¹ Related to this call/reject effect, it is worth pointing out that, although we did not measure it, we found a similar effect in the surgical departments, where the number of interdepartmental

referrals requested depended on the doctor attending the patients.

This study has several limitations. It is a retrospective study and the data about interdepartmental referrals was obtained from administrative, not clinical, records. Furthermore, it only analyses requests for interdepartmental referrals made in working hours, excluding those made to duty doctors. However, the characteristics and behaviour of interdepartmental referrals seem to be similar in both cases.^{4,12} Another limitation is that the data of clinical interest from the MBSD were obtained from the discharge reports from the surgical departments. These reports lack quality² and can even contain errors.¹³ In this sense, we should point out that only 45% of the discharge reports written by the OST department had a CCI>0, a percentage which increased to 71.3% if patients were discharged by a medical department.¹⁴ These limitations in the surgical discharge reports may help to explain the difference in the CCI scores of our patients and those published by other authors.¹⁵ In any case, the variations we found in CCI scores can be assessed as the reports were written by the same surgical specialists and under the same conditions. Another important limitation is that the study is limited to a single department of internal medicine in one hospital. Both have their own way of organising interdepartmental referrals, which may have had a considerable influence on the findings obtained. Given the variation in the way that hospitals in general, and departments of internal medicine in particular, organise interdepartmental referrals,¹⁶ more studies of this kind are necessary to confirm our findings.

In conclusion, we can state that there has been a sharp increase in the number of requests for interdepartmental referrals made to internal medicine by the surgical departments in our hospital. This cannot be put down to the increase in admissions to these departments, but could be associated with the increases in age of their patients and the comorbidities they suffer. Requests for interdepartmental referrals showed marked monthly variations that we must take into account when planning the work of the department

of internal medicine. In some cases there is a reject effect, and probably a call effect too, on the part of the consulting doctor from the surgical departments when requests for interdepartmental referrals are made to internal medicine.

Conflict of interest

The authors affirm that they have no conflicts of interest.

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