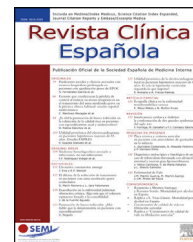




Revista Clínica Española

www.elsevier.es/rce



ORIGINAL ARTICLE

Analysis of infectious diseases care in Spanish hospitals from 2016 to 2020, including the first year of the SARS-CoV-2 pandemic



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Received 26 October 2022; accepted 28 February 2023

Available online 5 April 2023

KEYWORDS

Infections;
SARS-CoV-2;
Training

Abstract

Aims: This work aimed to review patients discharged from Spanish hospitals with a principal diagnosis of infection during a 5-year period, including the first year of the SARS-CoV-2 pandemic.

Materials and method: This work analyzed the Basic Minimum Data Set (CMBD) of patients discharged during the 2016–2020 period from hospitals in the Spanish National Health Service in order to identify cases with a principal diagnosis of an infectious disease according to the ICD-10-S code. All patients older than 14 years of age admitted to a conventional ward or intensive care unit, excluding labor and delivery, were included in the analysis and were evaluated based on the discharging department.

Results: Patients discharged with infectious diseases as the principal diagnosis have increased from 10% to 19% in recent years. A large part of the growth is due to the SARS-CoV-2 pandemic. Internal medicine departments cared for more than 50% of these patients, followed by pulmonology (9%) and surgery (5%). In 2020, 57% of patients with a principal diagnosis of infection were discharged by internists, who cared for 67% of patients with SARS CoV-2.

Conclusions: At present, more than half of patients admitted with a principal diagnosis of infection are discharged from internal medicine departments. Given the growing complexity of infections, the authors advocate for an approach in which training allows for specialization, but within a generalist context, for the better management of these patients.

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PALABRAS CLAVE

Infecciones;
SARS-CoV2;
Área de capacitación

Análisis de la atención a patologías infecciosas en los hospitales españoles en el periodo 2016–2020, incluyendo el primer año de pandemia por SARS-CoV-2

Resumen

Introducción: Revisar los pacientes atendidos en los hospitales españoles dados de alta con un diagnóstico principal de infección en un periodo de 5 años, incluyendo el primer año de la pandemia por SARS-CoV-2.

Material y métodos: Se han analizado los datos del Conjunto Mínimo Básico de Datos (CMBD) de los pacientes dados de alta durante el periodo 2016–2020 de los hospitales del Sistema Nacional de Salud de España identificando aquellos que tuvieran un diagnóstico principal de enfermedad infecciosa según el código CIE-10-S. Se han incluido en el análisis todos los pacientes mayores de 14 años que hubieran ingresado en una planta convencional o de cuidados intensivos, excluyendo los partos, y se han evaluado las altas en función del servicio de alta.

Resultados: Los pacientes dados de alta con patología infecciosa han aumentado del 10% al 19% en los últimos años, y gran parte del crecimiento se debe a la epidemia por SARS-CoV-2. Los servicios de medicina interna atienden a más del 50% de estos pacientes, seguidos de neumología (9%) y cirugía general (5%). En el año 2020 el 57% de los pacientes con diagnóstico principal de infección fueron dados de alta por internistas, que atendieron al 67% de los pacientes con SARS-CoV-2.

Conclusiones: Actualmente más de la mitad de los pacientes que ingresan con diagnóstico principal de infección son dados de alta en medicina interna. Dada la complejidad creciente de las infecciones, abogamos por un abordaje en el que un área de capacitación permita una especialización, pero dentro de un contexto generalista, para el mejor manejo de estos pacientes. © 2023 Elsevier España, S.L.U. y Sociedad Española de Medicina Interna (SEMI). Todos los derechos reservados.

Introduction

It is clear that Internal Medicine (IM) is a core medical specialty¹. Specialization based on scientific programs has almost two centuries of history², driven by technological and scientific progress. In surgery, the perfection of respirators and ventilation techniques during the polio epidemic in Denmark³ in the early 1950s made anesthesia safer and more prolonged, with a decrease in patient mortality. Surgeons began to specialize in operations centered on specific areas of the anatomy of the patient. In the United States, the first specialty created was Ophthalmology as a separate discipline and with a defined body of theoretical knowledge². In the medical field², concrete specialties began to appear in the 1930s, and were often regarded as “subspecialties” dependent upon Internal Medicine as the common core discipline. Over time, some of them became independent, leading to the specialties of Cardiology, Pneumology, Nephrology, etc. This development was almost always related to the introduction of some diagnostic technique such as ultrasound or endoscopy, or therapeutic procedure such as dialysis. In general, a specialty is considered to be acknowledgeable as such if it possesses a sufficient theoretical body that cannot be fully included within the core discipline. Recognition of a specialty also applies if there is an independent clinical application; if it is based on scientific knowledge that improves the quality of patient care; if there is an educational program; or if existence of the discipline implies

clear improvements that counteract the problems that may arise from the loss of a more general or broad-basis approach².

There are 47 accredited medical specialties in Spain⁴. The clinical management of infectious diseases does not currently exist as an independent specialty in this country. To date, specialists in Internal Medicine (internists) are mainly responsible for the management of infectious diseases, though there are a small number of hospitals in which specialists in Microbiology – following brief rotation through Internal Medicine to become familiarized with the clinical setting – perform such care activities. In a considerable number of our hospital centers, some internists who thanks to their general vision can deal with all types of diseases, have become specialized in the management of patients with infections, and currently represent an unrecognized “training area”. The model in Europe⁵ is quite heterogeneous, with the management of infectious diseases being a specialty recognized as such in some countries, while in others it is a subspecialty of Internal Medicine or of other specialties.

In order to explore the current situation, we have analyzed the management of infectious disease in patients seen in Spanish hospitals, with special attention to the Departments that have discharged the patients and their evolution over the last 5 years. We have included the year 2020, corresponding to the onset of the SARS-CoV-2 pandemic.

Table 1 Some characteristics of the study population^a.

Variable	Total	2016	2017	2018	2019	2020
Patients with a primary diagnosis of infection (%)	12%	10%	10%	12%	11%	19% ^b
Patients >74 yrs (%)	44%	46%	47%	45%	46%	39% ^b
Male sex (%)	52%	53%	52%	51%	51%	53%
Hospital mortality (%)	17%	16%	16%	15%	15%	21% ^b
Mean stay	8.57	7.74	7.18	7.76	7.62	12.57
ICU stay	9.08	9.06	8.74	8.74	8.62	10.22
Admissions per 10,000 inhabitants	107.99	84.6	94	111.1	101.31	148.94 ^b
Mean cost (EUR €)	3485	3792	2362	3702	2796	4777

^a Source: NATIONAL MBDS: Spanish Ministry of Health.^b $p < 0.05$ versus previous years.

Material and methods

We analyzed the data from the Minimum Basic Data Set (MBDS) of the patients discharged during the period 2016–2020 from the Hospitals of the Spanish National Health System (NHS), provided by the Ministry of Health and Consumer Affairs, identifying those individuals with a primary diagnosis of infectious disease according to the ICD-10-S code. The diagnoses used were those included in chapter CERTAIN INFECTIOUS AND PARASITIC DISEASES (A00-B99), as well as the diagnoses G00-G02 MENINGITIS, G04 ENCEPHALITIS, G06-G07 CEREBRAL ABSCESS, I33 ENDOCARDITIS, J01-J06 UPPER RESPIRATORY TRACT INFECTIONS, J09-J11 INFLUENZA, J12-J22 LOWER RESPIRATORY TRACT INFECTIONS, K81 CHOLECYSTITIS, L02-L03 CELLULITIS, M00 SEPTIC ARTHRITIS, M01 JOINT INFECTIONS, M86 OSTEOMYELITIS, N10 PYELONEPHRITIS, N30 CYSTITIS, R50 FEVER OF UNKNOWN ORIGIN, and U07 COVID. Specific coding for SARS-CoV-2 was introduced in Spain in July 2020, with the technical instruction that included the code U07.1 identification of the active infection.

The MBDS⁶ is a mandatory database that all hospital management boards submit annually to the Department of Health of their region (Autonomous Community) and to the Spanish Ministry of Health and Consumer Affairs. The aim is to obtain the state standard — a group of indicators that define the functioning of the global hospitals of the NHS in relation to hospitalization events, once classified as diagnosis-related groups (DRGs)⁷, in the version in force for the year of analysis involved. The diagnoses and procedures were coded using the International Classification of Diseases (ICD-10-S), which has been used in Spain since 2016. The data collected in the MBDS include: hospital classification by size (group 1: less than 200 beds, group 2: 200,500 beds, group 3: 501–1000 beds, group 4: more than 1000 beds); circumstances of admission (1: urgent, 2: scheduled); circumstances of discharge (1: home, 2: transfer to hospital, 3: voluntary discharge, 4: death); and principal diagnosis coded by the ICD-10-S and considered as that which, after study of the patient, is established as the cause of admission to hospital according to the criterion of the clinical Department or physician attending the patient.

All patients over 14 years of age admitted to a conventional or intensive care ward (excluding deliveries), were

included in the analysis. The Department of the patient was considered to be the Department discharging the patient, regardless of whether or not he/she had previously been in other Departments. Intensive Care Unit stays were defined as the days the patient remained in the ICU at any time during admission, and were added to the total time of stay for calculation of the mean stay. The mean cost was that assigned by the Spanish Ministry of Health, and corresponded to the estimated mean cost for each DRG in the weights and costs estimation process of the NHS in its current version, calculated or updated for the reference year.

A general descriptive analysis and an analysis of the database were performed, describing the demographic data (age, sex) and activity variables (mean stay, weight, cost), ICU stay, and distribution by Departments. The evolution of the activity was compared using the chi-squared test with Yates correction for quantitative variables. Statistical significance was considered for $p < 0.05$. The calculation of incidents was based on the population over 15 years of age in the country at the start of the year of analysis, according to the data of the Spanish National Statistics Institute⁸.

The Stata/BE 17.0 package was used for the analysis.

Results

A total of 17,510,578 discharge episodes in patients over 14 years of age (excluding deliveries) were analyzed corresponding to the period 2016–2020. Of these patients, 12% had at least one primary diagnosis of infectious disease (2,158,871). The number of discharges involving infectious diseases increased over the years, with a marked rise in 2020 due to the SARS-CoV-2 pandemic, from 334,017 patients discharged in 2016 to 603,738 in 2020. On a percentage basis, infections increased from 10% of all discharges in 2016 to almost 20% in 2020.

The most relevant characteristics of these patients are shown in Table 1. The evolution of the annual incidence is reflected in Fig. 1.

Of the total infections seen in recent years among admitted patients, more than half have been seen by Departments of Internal Medicine — a proportion that increased notoriously in 2020, because most patients with SARS-CoV-2 infection were managed by internists. Almost 10% of all the

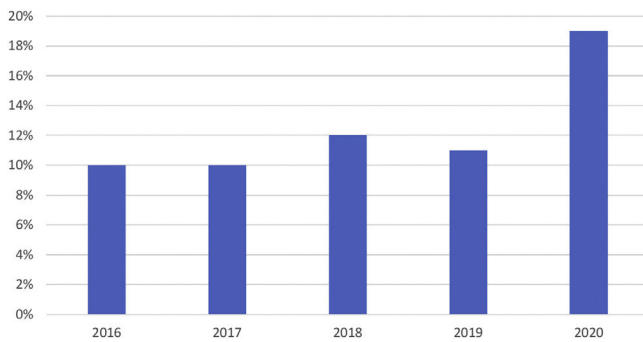


Figure 1 Evolution of the percentage of patients discharged with a primary diagnosis of infection.

patients with infectious disease as primary diagnosis in our series were seen by pneumologists, less than 5% in Departments of Infectious Diseases, and 3% in Geriatrics. The data are presented in Table 2.

Twenty percent of the admissions in Internal Medicine, Geriatrics and Pneumology involved an infection as primary diagnosis in the period 2016–2019, with a significant increase in the year 2020 due to SARS-CoV-2. Sixty percent of the patients discharged from infectious diseases had a primary diagnosis of acute infection (Table 3).

With regard to the patients admitted due to SARS-CoV-2 disease, a total of 134,892 episodes with this code as primary diagnosis in the hospital wards were recorded in 2020. Of these cases, 65% were seen in Internal Medicine, followed by almost 15% in Pneumology (Table 4).

Discussion

The incidence of infectious diseases⁹ has been growing, as reflected by the registries, and in our opinion there are

Table 4 Patients admitted with SARS-CoV-2 disease in 2020 to Spanish hospitals and specialists in charge of care.

	2020	%
IM-Internal medicine	86885	64.4%
PLM-Pneumology	19834	14.7%
INF-Infectious diseases	14017	10.4%
IC-Intensive care	3868	2.9%
GRT-Geriatrics	1965	1.5%

a number of reasons for this. On one hand, mention must be made of the increased prevalence of immunosuppression among the population, due to the use of immunosuppressive drugs for the treatment of different autoimmune diseases and oncological conditions. On the other hand, hospitalized patients are increasingly exposed to the use of instruments and invasive procedures that open the door to germs¹⁰. In addition, the ageing of the general population results in an increase in the average age of the hospitalized population¹¹, with multiple disease conditions in those admitted¹² to Internal Medicine that increases vulnerability to infection. Lastly, mention must be made of the appearance of pathogens that are increasingly resistant to drugs¹³ — a growing problem that leads to increasingly longer treatments, prolonged hospital stay, and an increased risk of developing new disorders, whether infectious or otherwise. Our analysis shows that in recent years there has been a progressive increase in adult patients discharged with infection as the primary diagnosis — this being particularly manifest in 2020 due to the SARS-CoV-2 pandemic.

The data of our study evidence this rising trend in the context of disease requiring hospital admission, with many patients admitted due to infectious processes, and this phenomenon has moreover grown in recent years. One hundred of every one 100,000 inhabitants over 15 years of age are

Table 2 Distribution of hospital infectious diseases in the past 5 years in Spanish hospitals according to Department of care.

	GS	GRT	INF	IM	PLM	SSU
2016	6.5%	2.8%	3.6%	51.0%	10.0%	2.2%
2017	6.4%	3.2%	3.6%	51.5%	9.4%	2.0%
2018	5.5%	2.8%	2.9%	48.8%	9.1%	1.9%
2019	6.0%	3.0%	3.4%	51.0%	9.4%	2.2%
2020	3.8%	2.3%	5.8%	57.1%	9.4%	0.6%
	5%	3%	4%	52%	9%	2%

GS: general surgery, GRT: geriatrics, INF: infectious diseases, IM: internal medicine, PLM: pneumology, SSU: short stay unit.

Table 3 Percentage of patients with a primary diagnosis of infectious disease at discharge in the past 5 years according to Department of admission.

	GS	GRT	INF	IM	PLM	SSU
2016	3%	16%	50%	19%	20%	19%
2017	3%	19%	57%	20%	21%	23%
2018	3%	19%	60%	18%	22%	21%
2019	3%	19%	60%	18%	20%	22%
2020	3%	24%	75%	29%	34%	20%
	3%	20%	60%	21%	23%	21%

admitted due to infection as the primary diagnosis each year. In addition, many patients are elderly (more than 40% are over 74 years of age), have stays that exceed one week, and the mean cost is over 3000 euros per admission, with high comorbidity¹⁴ and the presence of associated disease. These subjects therefore would benefit from care by staff with more general training, able to also manage the rest of the patient problems¹. We see in this study that in the Departments of Internal Medicine, Geriatrics and Pneumology, over 20% of the discharged patients had been admitted due to infection as the primary diagnosis.

During the year 2020, at least two-thirds of the patients with SARS-CoV-2 infection were seen in the Departments of Internal Medicine, according to data from the Ministry. The records generated by clinicians in our hospitals¹⁵ confirm this situation. In that year, patient severity and mortality were high, with an initial mortality rate of 20% and a large proportion of individuals of advanced age and with multiple disease conditions¹⁴. This warrants the adoption of a general approach.

The future scenario is that of a hospital with elderly patients presenting multiple disorders and with a high incidence of infectious disease. In this context, the prevalence of infectious processes can be expected to increase, with more complex management, and requiring increasingly well trained physicians. In our opinion, this perspective warrants that the management of infections can be a field open to professionals that are well trained in general aspects. This kind of profile allows an integral approach to these patients, considering also the specific characteristics of a given disease, but without becoming detached from Internal Medicine as the reference discipline. On the other hand, the appearance of new subspecialties¹⁶ places the global vision of the patient at risk, at a time where ageing and multiple morbidity increasingly demand such a vision.

Our study has some limitations, since the available data only refer to patients discharged with a primary diagnosis of infection, which represent only a part of all patients with infectious conditions hospitalized during the study period. In addition, as this is an administrative database¹⁷ not created for research purposes, some information that would allow for more in-depth interpretation of the results cannot be obtained. For example, in relation to age or mean stay, no standard deviations, ranges, or other measures such as the median are available. On the other hand, as a strength of the study, we have analyzed virtually all the discharges that have occurred in our country over a 5-year period, exceeding 17 million patients. We therefore consider this approach to be representative, allowing us to conclude that most patients with a primary diagnosis of infectious disease are currently seen by internists.

Another limitation of the study is referred to the coding of SARS-CoV-2. The Ministry instruction appeared in July 2020¹⁸, specifying U07.1, U07.2 as the applicable code. As a result, the numbers of patients with this infection may be underestimated in the analysis made, since other ICD codes were initially used in reference to the discharge of patients with SARS-CoV-2 infection. However, the underestimation is consistent for all Departments, so we believe that it does not affect the conclusions of the study.

Most patients discharged due to infection in our country have been seen by Internal Medicine, which allows for a general care approach. The new specialties may benefit patients and physicians, though the proliferation of some disciplines not well supported by the abovementioned principles might not afford any real benefit. A general management view of patients represents a quality bonus, particularly in the current scenario of population ageing. We therefore consider that the most adequate approach for the management of infections in particular and the emergence of new areas of knowledge in general is to progress by creating training areas that can be accessed from different specialties once the physician has been trained in his or her own concrete area. This approach has been adopted in many countries² and seems to us to be the most reasonable strategy.

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