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Original Article

Progress of the Attractiveness of Rheumatology Among Medical Speciality Training Candidates (MIR) in Spain[☆]



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ABSTRACT

Objective: To describe the progress of the attractiveness of rheumatology at successive MIR calls, from 1983 to 2014.

Methods: Candidates in the Spanish training system for medical doctors choose their specialties sequentially, ordered by their ranking in the qualifying exam (MIR). The highest, median and lowest rank of candidates choosing rheumatology training positions in every MIR call from 1983 to 2014 was requested from the Department of Management of Specialized Medical Training (General Department of Professional Regulation; Spanish Ministry of Health). To compare, the same data was requested for other specialties. In order to define and analyze the attractiveness of each specialty we introduce an 'index of attractiveness', based on the normalized difference of the actual median rank reported for each year and the average median obtained in 1000 simulations in which candidates choose specialties at random.

Results: Regarding the median of the election of rheumatology, the range went from 244th in 1983 to 3394th in 2008, showing a progressive increase over the years in absolute figures. A mathematical simulation allowed quantifying the difference between the observed median and what would have happened if specialties had been chosen by pure chance. Results show a tendency to recover the attractiveness of rheumatology in recent years.

Conclusions: After a sharp decline in the attractiveness of rheumatology during the last years of the 20th century, there seems to be a recovery.

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Evolución del atractivo de la Reumatología entre los electores a plazas de médico interno residente

RESUMEN

Objetivo: Describir la evolución del grado de atractivo de la Reumatología en las sucesivas convocatorias MIR de 1983 a 2014.

Métodos: Se solicitó al servicio de Gestión de Formación Sanitaria Especializada de la Subdirección General de Ordenación Profesional del Ministerio de Sanidad español datos de elección de Reumatología de las convocatorias MIR de 1983 a 2014: número de orden de elección de la primera y última plazas de Reumatología, así como la mediana. A efectos de comparación, se solicitó la mediana de elección de otras especialidades. Para definir el grado de atractivo de cada especialidad, se realizó un análisis matemático de 1.000 simulaciones sobre la mediana que habría obtenido cada especialidad si se hubieran elegido al azar y se calculó la desviación entre la mediana observada y la mediana por azar generada mediante las simulaciones.

Palabras clave:

Reumatología

Especialización

Atractivo

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Resultados: La mediana de elección de Reumatología presentó un rango desde el número 244 en la convocatoria de 1983 al número 3.394 en la convocatoria del año 2008, observándose, en términos absolutos, un progresivo incremento a lo largo de los años. La simulación matemática permitió cuantificar la desviación entre la mediana observada y la que habría ocurrido si las especialidades se hubieran elegido al azar. Se objetivó una tendencia a la recuperación del atractivo de Reumatología en los últimos años.

Conclusiones: Tras un acusado descenso en el atractivo de la Reumatología entre los electores a plazas MIR durante los últimos años del siglo pasado, parece evidenciarse una recuperación.

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Introduction

Rheumatology is the specialty that concerns the study, prevention, diagnosis and treatment of medical diseases of the musculoskeletal system and systemic autoimmune diseases (SAD). The definition of the specialty is provided in the order from the Spanish ministry that regulates the training that residents should receive to be granted official accreditation as specialists in rheumatology recognized by the Spanish government.¹

Rheumatology practice has undergone significant changes in recent years, including the introduction of biological therapies or the widespread implementation of musculoskeletal ultrasound in routine clinical practice. On the other hand, the presence of rheumatologists in the body of professors teaching undergraduate and graduate medical studies appears to have shown a substantial increase in the last few years. Thus, it is to be hoped that there will have been greater exposure to the specialty by the most recent classes of medical undergraduates and graduates.²

The choice of a position for specialization using the ranking in the qualifying examination for Spanish medical residents (MIR) represents a unique and accurate observatory of the preferences of Spanish physicians toward the different specialties—medical, surgical and procedural—offered annually in the successive MIR calls.

The objective of this report was to describe the changes in the attractiveness of the specialty of rheumatology in successive MIR calls from 1983 to 2014, and to compare them with those observed in other specialties.

Methods

Every year, the Spanish Ministry of Health announces a call for specialized medical training. Both the total number of positions offered and those available for each specialty change from one year to another. The choice of a position on the part of candidates is sequential, according to the ranking of each in the year that the call is posted. Thus, once all of the positions in a specialty have been chosen, this option is no longer available for candidates whose rank is higher.

The median rank of the candidates who choose a certain specialty in each call could be understood to be an indicator of the popularity of said specialty in that year. The median is the rank of the candidate who chose the position in rheumatology that occupied the mean position of those places offered for said specialty. For example, if there are 50 available positions for a specialty in a given year and the 50 best candidates in that call choose that specialty, the median rank for that year would be 25. In practice, the real median would typically be higher, as it is not very likely that all the best candidates would choose the same specialty. In general, it can be understood that the lower the median rank of a specialty indicates a greater attractiveness of that specialty in that given year.

It is necessary to be cautious in properly interpreting this estimator of attractiveness. For example, if, for a certain specialty, there are 100 positions one year and 50 the next, the median in the case that all the best candidates chose that specialty would be 50

and 25, respectively. This indicates that the median by itself is not a valid quantitative indicator of attractiveness for comparing the popularity of specialties over the years.

To rectify this situation, we created a normalized popularity index based on the difference between: (1) the mean median obtained by 1000 computer simulations in which the candidates chose the specialty at random and (2) the real median of each specialty for each year. This difference was appropriately normalized in relation to the total number of positions for each year.

To carry out this simulation, we asked the Department of Management of Specialized Medical Training of the General Department of Professional Regulation of the Spanish Ministry of Health, Social Services and Equality to provide data on the choice of the specialty of rheumatology in the MIR calls from 1983 to 2014. Specifically, we requested the number of positions of rheumatology offered each year and the highest and lowest ranks, as well as the median rank, of candidates choosing rheumatology in each MIR call. To enable comparisons with other specialties, we also asked for the number of positions offered and the median rank for cardiology, dermatology, endocrinology, internal medicine and allergology, as well as the total number of positions offered encompassing all of the specialties in each call (N_{tot}). The simulation shows the choice of the best N_{tot} of the MIR candidates for each year. In the simulation, the candidates choose a specialty of among the 6 named above on which they had data, and a seventh option referred to as “other”, which includes all the other specialties available for the MIR on which there was no data, and including those candidates who opted for not choosing a position in each call.

In the simulation, the candidates chose the specialty at random. The possibility of choosing a certain specialty, including “other”, concludes when all the available positions for that specialty have been chosen. From that point on, the random selection in the simulation is restricted to the other specialties. At the end of each simulation round, each candidate of the N_{tot} will have been assigned a specialty (including the possibility of “other”).

After each simulation, the median rank for each specialty was calculated. As the choice was random, this median varied from one simulation to another. Subsequently, we calculated the mean of the medians of 1000 independent randomly assigned simulations. This generated a mean median for each specialty for each year.

The popularity index was generated by comparing the median obtained at random with the real median for each specialty for each year. If the real median was lower than the randomly produced median, it could be considered that the specialty was popular; otherwise, if the real median was higher than the randomly generated median, it could be considered that the specialty was not popular.

To achieve a normalized quantitative measure that can be compared over a period of years, we utilized the following popularity index:

$$I = \frac{\text{Mean median of the simulations} - \text{Real median}}{N_{\text{tot}}}$$

It could be that the outcome numerical measure of the simulation would change if we utilized the data relative to all of the

Table 1
Number of Order of Choice of the First Position, Median and Last Position in Rheumatology by Candidates for Medical Specialty Training (MIR) in Calls From 1983 to 2014.

Call	First	Median	Last
1983	9	244	648
1984	2	297	629
1985	22	361	770
1986	109	346	649
1987	100	614	1258
1988	30	615	1538
1989	232	1077	1955
1990	107	1147	2133
1991	64	1073	1772
1992	152	1810	2591
1993	157	1612	2836
1994	11	1517	3488
1995 ^a	949	2131	2489
1996 ^a	9	2156	2621
1997 ^a	31	1975	2431
1998 ^a	729	2140	2733
1999 ^a	995	2219	2643
2000 ^a	757	1926	2436
2001	46	2382	3010
2002	159	2626	3415
2003	338	2656	3882
2004	654	2704	3552
2005	963	2814	3903
2006	70	3014	4221
2007	26	3203	4913
2008	489	3394	4760
2009	287	3117	4714
2010	194	2835	4184
2011	12	2785	4830
2012	56	2678	4913
2013	34	2470	4683
2014	324	2682	4858

^a In these years only the positions assigned in the general call were taken into account, excluding those assigned in the specific calls for family and community medicine, which were directed to those who graduated from medicine after January 1, 1995.

specialties included in the “other” category. However, we would not expect changes in the shape of the curves. As a measure of verification, we calculated another simpler popularity estimator that consisted in dividing the negative median of each specialty by the number of total positions available each year. We observed that the qualitative behavior (curves) of this simpler index was similar to that obtained by simulation.

Results

Table 1 shows the number of the first position chosen, the median and the number of the last position chosen in the specialty of rheumatology in the calls from 1983 to 2014. The best rank in the order of choice of the first position in rheumatology was in the 1984 call, in which number 2 of the MIR candidates chose that specialty, whereas the call in which the first position in rheumatology was highest was that of 1999, in which the first position chosen was number 995. With respect to the number with which the last position offered was chosen, it ranged between number 629 in the 1984 call and number 4913 in the calls of 2007 and 2012. Concerning the median, the range falls between number 244 in the 1983 call and 3394 in the call of 2008; it can be observed that, in absolute terms, there is a progressive increment over the years.

As the median is influenced not only by the attractiveness of the specialty among the MIR candidates, but by the total number of positions and the number of positions offered in each specialty, the mathematical simulation utilized enabled the quantification of the deviation between the median observed and the one that would have resulted if the specialties had been selected by pure chance.

Table 2 shows the total number of positions offered, the positions offered in each specialty and the medians according to choice in rheumatology, as well as dermatology and cardiology (currently considered to be highly attractive among MIR candidates), internal medicine (a specialty that was often chosen in the 1980s), endocrinology (a medical specialty that currently has a somewhat greater attractiveness than rheumatology, but less than dermatology and cardiology) and allergology (a specialty that has a moderate attractiveness at present). Fig. 1 shows the change in the differential of the median observed as opposed to that calculated with random selection in rheumatology versus the other specialties analyzed. There is a trend toward recovery of the attractiveness of rheumatology after a nadir seen at the end of the 1990s. From a graphic point of view, there are 2 upward slopes: one very steep starting around 2000 and the other, with a shorter duration, that started in 2008 and with an apparent plateau effect that commenced in 2010.

Discussion

The system for the choice of MIR positions is characterized as being centralized, is absolutely meritocratic and is extended throughout all of Spain. This selection system, governed by the order of preference of the candidates, represents an extraordinarily precise vantage point from which to view the attractiveness of the different specialties among physicians who graduated from Spanish medical schools, who represent the main body of candidates for MIR positions. Our study demonstrates a severe crisis in the attractiveness of rheumatology, which appears to be recovering in recent years.

It is difficult to define the causes responsible for the profound deterioration in the attractiveness of the specialty that commenced at the end of the 1980s. Rheumatology went from being an attractive specialty, that was chosen by MIR candidates who ranked among the very first, to be one of the least demanded specialties. This all occurred with no relevant change in the content of the specialty. The lack of interest in rheumatology that started to take shape at the end of the 1980s had a clear impact on the advice that recent medical graduates received from residents and young rheumatologists, immersed in an imminent future of unemployment and precarious contracts.³

The specialty of rheumatology is essentially clinical. There are no complex techniques, like digestive endoscopy or bronchoscopy. It is based on the specialization of the work, as in other medical specialties like dermatology, endocrinology, allergology, medical oncology and neurology. It has the added attractiveness that the field includes the management of SAD,¹ and is the medical specialty that specifically trains its residents in the management of the complex situations presented by patients diagnosed with those processes.

Over the last 20 years, there have been substantial changes that may be responsible for the apparent recovery of the attractiveness of rheumatology: the introduction of ultrasound in rheumatic diseases and of biological agents, as well as a greater presence of rheumatologists on medical faculties.

The extraordinary efforts of the school of ultrasound of the Spanish Society of Rheumatology (SER) have added a sixth sense to the examination of the musculoskeletal system performed by rheumatologists,^{4,5} adding arthrocentesis, capillaroscopy, guided injections, the study of microcrystals and synovial and salivary gland biopsy, a technique that many rheumatologists consider to be essential to our activity,⁴ although it is not recognized as such by the official training guidelines.¹

Another point of inflection is the introduction of biological therapy, which has revolutionized the management of diseases like rheumatoid arthritis, ankylosing spondylitis, nonradiographic axial

Table 2

Number of Total Positions, Positions Financed by Specialty and Median According to Choice in the Different Specialties by Candidates for Medical Specialty Training (MIR) in Calls From 1983 to 2014.

Call	Total positions	Rheumatology		Cardiology		Dermatology		Internal medicine		Endocrinology		Allergology	
		Positions	Median	Positions	Median	Positions	Median	Positions	Median	Positions	Median	Positions	Median
1983	1486	24	244	19	334	19	235	98	375	15	174	13	438
1984	1353	30	297	17	150	14	219	95	302	11	229	12	359
1985	1335	36	361	17	205	20	163	93	465	15	129	12	484
1986	1734	18	346	23	238	27	295	70	666	16	222	38	569
1987	2288	37	614	30	385	38	212	90	986	27	183	35	416
1988	3060	40	615	40	249	42	301	174	1753	33	378	34	628
1989	3928	33	1077	50	424	42	282	182	1998	33	596	39	1012
1990	4025	40	1147	60	390	43	133	192	1988	34	272	43	1017
1991	3886	32	1073	65	331	41	427	196	1866	35	224	38	1235
1992	4277	40	1810	76	347	43	307	203	1967	42	178	42	1922
1993	4306	42	1612	83	241	45	518	212	1619	40	265	43	2309
1994	4442	33	1517	88	365	46	425	212	1733	31	244	42	2641
1995 ^a	3907	42	2131	75	170	47	323	211	1561	35	444	45	2381
1996 ^a	3333	40	2156	75	207	48	457	217	1513	31	424	42	2445
1997 ^a	3170	40	1975	97	232	49	393	217	1474	28	290	41	2166
1998 ^a	3194	42	2140	97	289	51	376	224	1413	30	448	44	2221
1999 ^a	3201	40	2219	97	355	52	403	228	1782	29	368	47	2378
2000 ^a	3526	37	1926	101	208	54	343	229	1941	34	579	49	2424
2001	5242	39	2382	102	259	56	347	232	2093	44	861	49	2895
2002	5417	39	2626	104	284	57	327	238	2264	47	826	47	3099
2003	5661	41	2656	114	318	57	297	239	2542	52	808	49	3359
2004	5480	43	2704	111	284	54	217	247	2797	51	768	48	3591
2005	5717	43	2814	119	304	58	237	261	2782	55	721	54	4285
2006	5804	44	3014	129	330	64	536	265	2835	56	792	51	4435
2007	6216	48	3203	144	422	69	326	293	2624	62	1151	56	4625
2008	6706	48	3394	153	481	74	282	324	3339	68	1448	58	4707
2009	6941	51	3117	158	624	76	306	342	3575	75	976	59	4911
2010	6873	49	2835	158	534	83	391	345	3282	75	1419	60	4933
2011	6704	52	2785	156	557	81	402	338	3477	75	1431	57	5036
2012	6349	50	2678	153	427	77	430	313	3238	76	1915	44	4705
2013	5920	48	2470	151	447	77	312	300	3050	73	1485	46	4617
2014	6017	50	2682	154	611	79	354	294	2695	72	1458	37	4492

^a In these years only the positions assigned in the general call were taken into account, excluding those assigned in the specific calls for family and community medicine, which were directed to those who graduated from medicine after January 1, 1995.

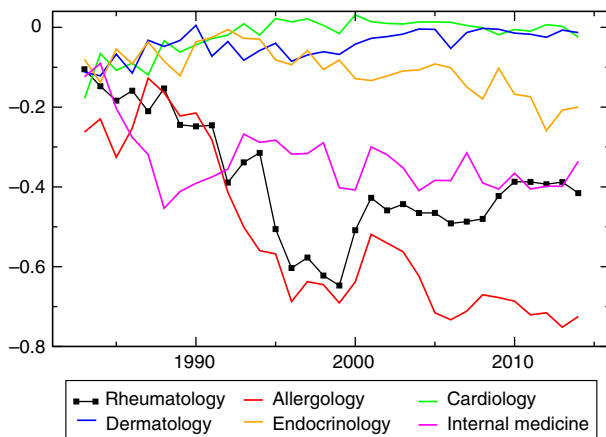


Fig. 1. Changes in the differential of the median observed as opposed to that calculated with random selection in rheumatology versus the other specialties analyzed.

spondyloarthritis and psoriatic arthritis. The utilization of biological therapies has signified a profound change in the prognosis of our patients in terms of control of symptoms, quality of life and intermediate and long-term prevention of structural and functional deterioration.⁶ For the first time in the history of the specialty, the administrators of hospitals have focused on rheumatic patients as a budgetary problem to be taken into account. But, for the present purposes, it has meant that medical students have witnessed the clinical role of a specialty with enormous potential to modify the outcome of many patients.

This takes us to the last factor of the equation: the perception that medical students and future MIR candidates become acquainted with the specialty of rheumatology throughout their training. In this respect, the presence of rheumatologists on the undergraduate teaching staff is fundamental. Their comportment with undergraduates and what they transmit to students results to a great deal in conveying the attractiveness of rheumatology among MIR candidates. If rheumatologists are capable of transmitting its added value, their enthusiasm and its health outcome, it is unquestionable that the attractiveness of the specialty will continue this upward trend, as recent data seem to indicate. For this purpose, programs like Reumacademia, endorsed by the SER, are of maximum strategic importance when it comes to promoting the presence of rheumatologists on the faculty of medical schools.²

The reduced attractiveness of the specialty of rheumatology is not a question involving Spain alone, and has been the subject of reflection in Canada, the United States and the United Kingdom.^{7–10} Surveys in different countries have demonstrated that the opportunity of being able to complete a rotation in rheumatology during the period of core studies in residency or while in medical school increases the probability that residents or students ultimately choose rheumatology as their definitive specialty.^{7,8} In fact, it seems to be important that exposure to rheumatology occurs as soon as possible since interest in the specialty wanes the longer this contact takes to come about.^{9,10}

We do not know the distribution by age and sex of the candidates, or where they are from. Their expectations in terms of professional and economic aspects and hopes of future contracts are also unknown, as is the need for certain requirements for access to specialized training. It is not possible to speculate on the

influence of other determining factors that might have modified the attractiveness of rheumatology over the course of years.

In short, our study indicates that the attractiveness of rheumatology among MIR candidates is recovering, and that a realistic and enthusiastic transmission to medical students and, in the future, to residents during the period of medical core studies, showing what the specialty signifies for patients, is probably the best recipe for consolidating and enhancing this recuperation.

Ethical Disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

Conflicts of Interest

The authors declare they have no conflicts of interest.

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