

Is "ChatGPT" capable of passing the 2022 MIR exam? Implications of artificial intelligence in medical education in Spain

¿Es capaz "ChatGPT" de aprobar el examen MIR de 2022? Implicaciones de la inteligencia artificial en la educación médica en España

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Abstract: Artificial intelligence and natural language processing models have burst into the field of medical education. Among them, the ChatGPT model has been used to try to solve different medicine exams at an international level. However, there is practically no literature in Europe or Spanish-speaking countries. The present work aims to evaluate the ability to answer questions of the ChatGPT model in the MIR 2022 exam. To do this, a cross-sectional and descriptive analysis has been carried out in which the 210 questions of the MIR exam convened in 2022 have been introduced into said model. and carried out in January 2023. ChatGPT has been able to correctly answer 51.4% of the questions, which means approximately 69 net in the MIR exam. According to estimates for this year, he would obtain a 7688, which would be slightly below the median of the population presented, but which would allow him to pass the cut-off mark and choose a large number of specialties. The result is similar to those obtained in the previous bibliography, slightly below the results obtained by said tool in the American USMLE exams. These types of models represent an opportunity for learning (analysis of reasoning, generation of debates, etc.) for medical students and residents, but they also pose a risk in many ways, especially in terms of veracity, ethics, and security. of the information. It is essential to train future specialists in the new reality of artificial intelligence so that they are able to use them and obtain benefits in a reasoned and safe way.

Keywords: ChatGPT ; MIR exam; artificial intelligence; medical education, postgraduate training.

Resumen: La inteligencia artificial y los modelos de procesamiento de lenguaje natural han irrumpido con fuerza en el ámbito de la educación médica. Entre ellos, el modelo ChatGPT ha sido utilizado para intentar resolver distintos exámenes de medicina a nivel internacional. Sin embargo, prácticamente no existe literatura en Europa ni países de habla hispana. El presente trabajo pretende evaluar la capacidad de responder preguntas del modelo ChatGPT en el examen MIR 2022. Para ello, se ha llevado a cabo un análisis transversal y descriptivo en el que se ha introducido en dicho modelo las 210 preguntas del examen MIR convocado en 2022 y realizado en enero de 2023. ChatGPT ha sido capaz de responder de manera acertada un 51,4% de las preguntas, lo que supone

aproximadamente 69 netas en el examen MIR. Según estimaciones para este año, obtendría un 7688, lo que estaría ligeramente por debajo de la mediana de la población presentada, pero que le permitiría pasar la nota de corte y escoger un gran número de especialidades. El resultado es similar a los obtenidos en la bibliografía previa, ligeramente por debajo de los resultados obtenidos por dicha herramienta en los exámenes americanos USMLE. Este tipo de modelos suponen una oportunidad para el aprendizaje (análisis de razonamiento, generación de debates, etc.) de los estudiantes de medicina y los residentes, pero también supone un riesgo en muchos sentidos, especialmente en cuanto a la veracidad, ética y seguridad de la información. Es fundamental formar a los futuros especialistas en la nueva realidad de la inteligencia artificial para que sean capaces de utilizarlas y obtener beneficios de manera razonada y segura.

Palabras clave: ChatGPT; examen MIR; inteligencia artificial; educación médica, formación postgraduada.

1. Introduction

ChatGPT, or Chat Generative Pre-trained Transformer, is a 175 billion parameter artificial intelligence and natural language processing (NLP) model that uses learning algorithms trained on big data to generate human-like responses to chat questions. the users (1). Since its launch it has achieved great success, being able to generate automatic responses to complex requests such as writing summaries, poems, computer programming texts and complex mathematical problems. In the world of medical education, this type of algorithms have also begun to attract the attention of teachers and students.

The World Medical Association advocates for a review of medical curricula and educational opportunities to foster a better understanding of the many aspects of artificial intelligence (AI) in healthcare, both positive and negative (2). Furthermore, in a 2019 statement, the Standing Committee of European Physicians (CPME) underlined the need to use AI systems in basic and continuing medical education (3). However, there are numerous ethical concerns in the use of this type of technology. Among them, the threat to security and privacy stands out, the changing nature of the doctor-patient relationship in the field of health, the generation of possible social inequalities and the development of AI that could end up substituting many professional tasks, with the consequent increase in unemployment rates (4.5).

Within the different opportunities offered by artificial intelligence, linguistic models have begun to be investigated as tools for personalized interaction with the patient and health education of citizens (6-7). Although they have demonstrated their potential in different areas, these models are yet to show their ability in the areas of testing clinical knowledge through generative question-answer (QA) tasks. Among the existing literature, we found that Jin et al (8) achieved 68.1% with their artificial intelligence model. This responds to Yes/No questions using the set of abstracts available in Pubmed as the information base. Another article also by Jin et al (9) achieved an accuracy of 36.7% on a data set of 12,723 questions derived from Chinese medical licensing exams. Similarly, in 2019 Ha and Yaneva (10) reported 29% accuracy on 454 USMLE Step 1 and Step 2 questions.

In this area, the AI ChatGPT has shown more promising results than previous models. Gilson et al (11) and Kung et al (12), found that ChatGPT is able to correctly answer more than 60% of the questions representing topics covered in the USMLE Step 1 and Step 2

licensing exams. In turn, Huh S (13) in an article on parasitology and Anaki S. et al (14) in another on ophthalmology, obtain results of between 50 and 60%. However, there is the limitation that practically all the aforementioned bibliography is carried out in Asia and North America, while there is a gap in the literature in Europe and in Spanish-speaking countries.

Trying to respond to all of the above, this article's main objective is to evaluate the performance capacity of ChatGPT in the entrance exam to Specialized Health Training in Spain, known as the MIR exam, in its 2022 edition, which was taken by applicants to this training in January 2023. As a secondary objective, the article intends to evaluate the accuracy capacity of the model based on the specialty, type, and content of the different questions.

2. Methods

A cross-sectional and descriptive analysis has been carried out in which the 210 questions of the MIR exam convened in 2022 by the Ministry of Health and held in January 2023 have been entered, in version 0 of the ChatGPT artificial intelligence tool, with the following introduction: "What is the correct answer to the following question of the MIR 2022 in Spain?". It was decided to analyze all the exam questions, including those that had an associated image even though the image could not be entered, with the aim of having a global vision of their resolution capacity with all the exam questions. The questions were introduced in the aforementioned chat from February 2 to 5, 2023. The result offered by ChatGPT of the question has been compared with the response template published by the Ministry of Health of the Government of Spain, establishing each question as correct or incorrect. In addition, each question has been classified according to the following 4 parameters:

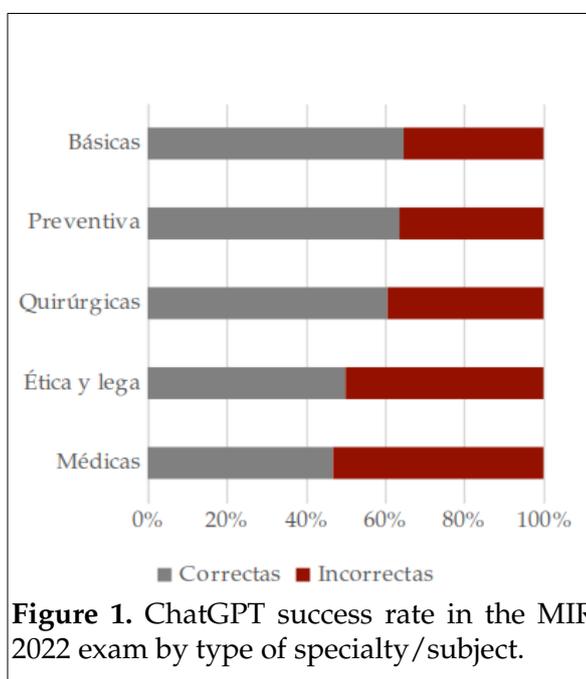
- **Specialty of the question:** each question has been classified according to the specialty and/or subject corresponding to it.
- **Type of specialty:** each question has been classified into a multiple variable delimited according to the type of specialty/subject, the variables being: "medical", "surgical", "basic", "preventive" and "ethical and legal".
- **Type of question:** each question has been classified as "CC" (clinical case), if the question included the information of a patient or not; "test" when the question did not include a CC and was affirmative; and "negative" when the question did not include a CC and asked for the wrong/wrong answer.
- **Content of the question:** each question has been classified into the following categories: "diagnosis", "treatment", "complementary tests", "physiopathology", "statistics" or "ethical and legal" depending on what type of information was asked in each question. If the question also referred to several of the above categories, it has been classified as "various".

Each of the authors has evaluated and classified 30 questions from the MIR 2022 exam, and subsequently all of them have been re-evaluated and discussed by all the other authors jointly. For the quantitative analysis of the different questions, the SPSS v. 25.

3. Results

The ChatGPT tool has been able to correctly hit 51.4% of the questions. This percentage increases to 54.8% when analyzing only the questions that did not have any associated image (185 questions). Converting to a "net" result of the exam, as the Ministry of Health classifies the results, would result in a total of 69.33 net responses.

Regarding the evaluation of the ability to hit ChatGPT by specialties, a breakdown of them has been made, as can be seen in Table 1. The percentage of hits in specialties such as ophthalmology and ICU stands out, where it obtains 100% of correct answers, followed by pharmacology and nephrology with 80%. In a negative sense, the specialties where fewer questions were answered correctly were rheumatology (21.4%), geriatrics (33.3%) and pediatrics (33.3%). However, these results must be taken with extreme caution, since the number of questions that justify them is very low, and they may be due to chance.



In the analysis by type of specialty/subject, it is worth noting that the questions on medical specialties are those with the lowest percentage of correct answers by the ChatGPT computer tool (46.9%) and the questions on "basic" and "preventive" were the ones that obtained the highest percentage of success (64.7% and 63.6% respectively), as can be seen in Figure 1.

Regarding the analysis by type of question (figure 2), the questions written in a negative format are the ones that have obtained the lowest percentage of correct answers (41%) compared to the affirmative questions categorized as CC (52%) and test (53%). Regarding the content of the question, it is significant that those questions that include information from different fields (categorized as "various") have had the lowest percentage of correct answers, with 32%, as can be seen in figure 3.

Table 1. Results of the ChatGPT model in the MIR 2022 exam

Specialty	Total questions	correct questions	% correct questions	Specialty	Total questions	correct questions	% correct questions
Digestive	14	7	50.0%	Legal Medicine and Ethics	6	3	50.0%
Endocrinology	14	8	57.1%	Dermatology	5	2	40.0%
Rheumatology	14	3	21.4%	Pharmacology	5	4	80.0%
Neurology	13	5	38.5%	Hematology	5	3	60.0%
Oncology	13	5	38.5%	nephrology	5	4	80.0%
Cardiology	12	5	41.7%	emergencies	5	3	60.0%
Pneumology	eleven	5	45.5%	biochemistry and genetics	4	3	75.0%
preventive	eleven	7	63.6%	Physiology	4	2	50.0%
Psychiatry	eleven	6	54.5%	Immunology	4	2	50.0%
Gynecology	9	5	55.6%	Ophthalmology	4	4	100.0%
Pediatrics	9	3	33.3%	Urology	4	2	50.0%
infectious	8	5	62.5%	Maxillofacial and ENT	3	2	66.7%
traumatology	8	5	62.5%	ICU	3	3	100.0%
Geriatrics	6	2	33.3%				

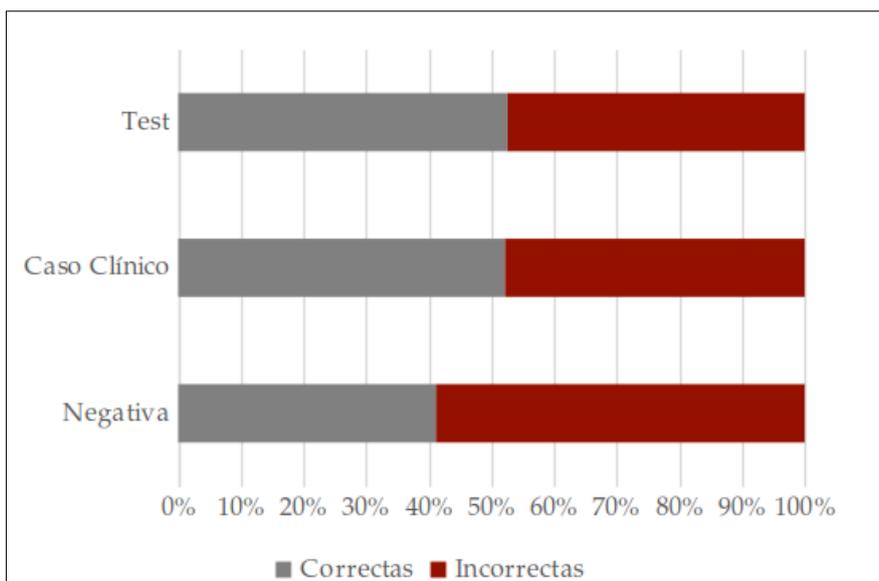


Figure 2. ChatGPT success rate in the MIR 2022 exam by type of question.

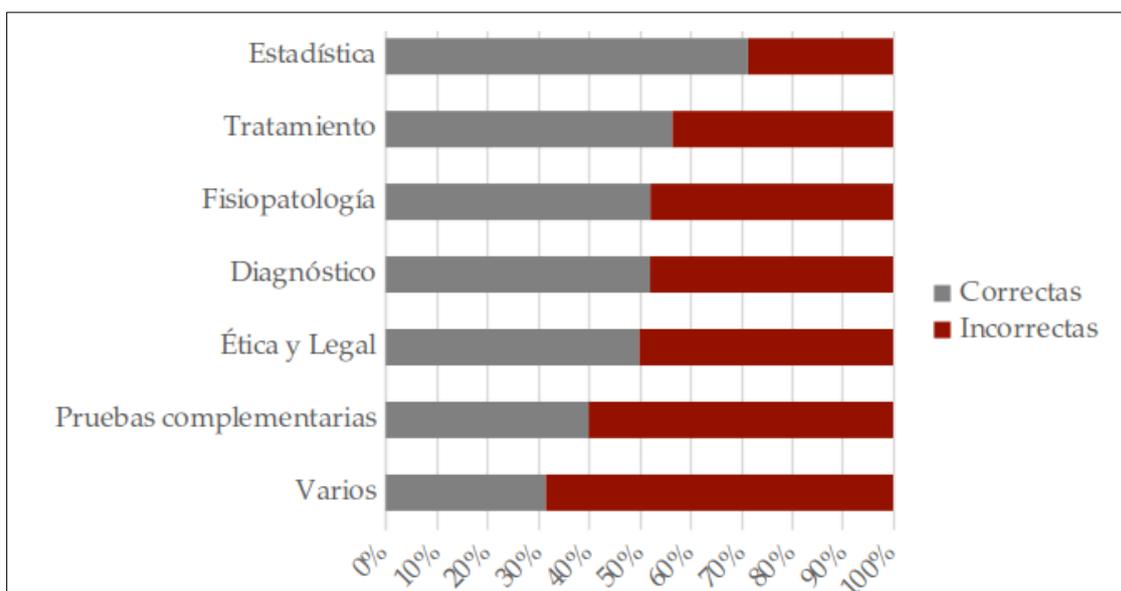


Figure 3. ChatGPT success rate in the MIR 2022 exam according to the content of the question.

4. Discussion

This study shows the ability of the ChatGPT tool to face the MIR 2022 exam. 51.4% correct answers have been obtained, which is similar to those shown in previous studies, being slightly below the studies in the US and Asia. Gibson et al. [11] describe in their study carried out with databases of USMLE questions a success rate of 60%, a figure that is usually the cut-off point of the test and is equivalent to the level of a third-year medical student in the USA. This hit rate is also similar to that presented by Huh [12] where he pits ChatGPT against medical students in a parasitology exam, obtaining 60.8% vs. 90.8%

respectively. It is important to emphasize that unlike the USMLE exam, which has highly standardized and regulated questions, the MIR exam presents a high variability and heterogeneity in its difficulty and complexity of questions, which can limit the interpretation of the ChatGPT application compared to other studies published. However, it confirms that ChatPGT obtains better results than other models, as it exceeds the studies published by Ha et al. (10) and Jin et al. (9).

As far as we know, there are no previous studies analyzing the MIR exam with AI tools, nor of other exams in Europe or in Spanish-speaking countries. The novelty of our study is the analysis of the characteristics of the questions that guide the analysis capacity of the tool. Previous studies such as that of Gibson et al. (11) analyzed the type of answer offered by ChatGPT without taking into account the formulation, type or specialty of the question, since it may be conditioned by the type of question, as evidenced in our study.

In accordance with the results of the study, the type of specialty/subject asked seems significant, since there is a difference in accuracy between questions related to basic clinical specialties with 46.9% vs. 64.7% correct, as well as in those questions formulated as negative compared to the classic multiple choice or clinical cases, 41% vs. 53%-52%, respectively. In turn, when information from different fields is asked (diagnosis, treatment, CP, etc.), the worst result is obtained, with 32%. This could be related to the conclusions of some previous works, such as those by Jin et al. (8) and Gibson et al. (11), who highlight that the model's ability to correctly answer a question may be related to its complexity and its ability to relate the message to the data within its corpus.

When transforming the ChatGPT results into the MIR 2022 exam, a score of 69.33 net responses was obtained. According to the statistical tools of one of the exam preparation academies (14), establishing the lowest average record grade (5 out of 10), the AI reaches an estimated position of 7688 in the MIR exam, with 9277 corrected exams to date February 4, 2023. This result would pass the exam cut-off mark (25% of the 10 best marks, with a theoretical maximum of 50 net) and would even be within the 8,550 places offered in this call. Based on the positions chosen in the MIR 2021 call (15) and with the results of this tool, the following positions were available: Immunology, Clinical Neurophysiology, Nuclear Medicine, Geriatrics, Clinical Pharmacology, Microbiology, Clinical Analysis, Occupational Medicine, Biochemistry Clinic, Preventive Medicine and Public Health or Family and Community Medicine.

AI tools such as ChatGPT are a growing phenomenon that will be part of our educational and clinical reality and which is interesting to incorporate skills in the field of medical education. The advantages are multiple, the most immediate being the practically instantaneous resolution of student questions about specific medical concepts, diagnoses or treatments and receiving precise and personalized answers to help them better structure their knowledge. From the teacher's point of view, it can be used as a method of knowledge assessment, mainly in remote environments, case generation or search for relevant and updated medical information quickly and efficiently [16]. The model also allows creating an interactive and on-demand learning environment thanks to its easily understandable and personalized responses, which can improve information retention and make the learning process more enjoyable for students [11]. However, the use of these tools requires a great critical spirit as well as a background in basic sciences. ChatGPT is trained with a large amount of data, its precision may be limited and it may produce incorrect answers due to not having access to the Internet or answers with real-time information and the biases used in data training may accentuate existing sociocultural biases [17]. In addition, the lack of real-time feedback and discussion, as well as the lack of adaptability and clinical context, can limit students' understanding and development of

clinical skills. Likewise, it is important to highlight that these tools lack ethical and legal criteria by which any medical act should be guided.

This work has certain limitations. On the one hand, the justification of the answers has not been analyzed at a qualitative level, having only taken into account the option without attending to the reasoning offered by the tool. Correct answers were found to contain information outside the question significantly more frequently than incorrect answers. On the other hand, the analysis carried out is purely descriptive, without presenting a statistical analysis that can confirm that the differences found are not due to chance. Another of the limitations corresponds to the fact that the questions of the MIR exam and the multiple-choice formats present an internal logic when answering the questions and formulating them that belongs to the training for the exam. I would highlight the fact that the tool has not been trained to identify these patterns and that this would necessarily lead to a worse result.

Given the results of this study, it would be interesting to continue the investigation of artificial intelligence in medical education in different ways. First of all, it would be interesting to replicate the results of the present study with MIR exams from previous years and other medical exams in Spanish-speaking countries, to compare whether or not ChatGPT's capacity is maintained. In addition, there is potential to highlight in the qualitative analysis of both the model's responses to clinical and ethical questions, as well as the opinion of students regarding these models, their difficulties, and their expectations. Lastly, it is necessary to continue researching the ethical and safety problems that these tools can pose, since it is a field that has not been studied and that can jeopardize its usefulness in the medical and educational fields.

5. Conclusions

- This is the first study carried out in a Spanish-speaking country that analyzes the performance and potential benefits and harms of the use of AI and NLP tools in the context of examinations as learning processes in medical education.
- The ChatGPT model has been able to pass the cut-off mark of the MIR 2022 exam, with 51% of correct questions. The percentage of success has varied depending on the type of question, the content and the specialty and/or subject of the same.
- The lowest percentages of correct answers have been presented in questions of medical specialties, formulated in the negative and when information from different fields is included (treatment, diagnosis, complementary tests, etc.).
- Transforming the result of ChatGPT into the MIR exam, a net 69.33 would have been obtained, with an approximate order number of 7688. With this number, in the MIR 2021 call, multiple specialties in different hospitals throughout the State could have been chosen.
- The results are similar to previous studies carried out with ChatGPT in other countries, obtaining slightly worse results than in the works published in the USMLE exams in the United States.

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Annex I. Coding of the questions of the MIR 2023 exam (abbreviations: CC, clinical case; PC, complementary tests).

Question No.	ChatGPT Result	Template version 0	Correct answer	Specialty / subject	Question type	Content question	Specialty type
1	1	3	NO	Neurology	CC	Diagnosis	Medical
2	2	3	NO	Neurology	CC	Diagnosis	Medical
3	3	4	NO	Traumatology	CC	Treatment	Surgical
4	1	1	YES	Cardiology	CC	Diagnosis	Medical
5	4	3	NO	Cardiology	CC	Diagnosis	Medical
6	1	2	NO	Cardiology	CC	Treatment	Medical
7	2	4	NO	Pneumology	CC	Diagnosis	Medical
8	1	1	YES	Digestive	CC	Diagnosis	Medical
9	1	4	NO	Gynecology	Test	Several	Surgical
10	4	2	NO	Hematology	CC	Several	Medical
11	4	1	NO	Infectious	CC	Diagnosis	Medical
12	3	3	YES	Digestive	CC	Diagnosis	Medical
13	4	4	YES	Pediatrics	CC	Diagnosis	Medical
14	3	1	NO	Digestive	Test	Diagnosis	Medical
15	3	2	NO	Oncology	CC	Diagnosis	Medical
16	3	4	NO	Dermatology	CC	Diagnosis	Surgical
17	3	3	YES	Dermatology	CC	Several	Surgical
18	1	2	NO	Oncology	CC	Diagnosis	Medical
19	3	4	NO	Oncology	CC	PC	Medical
20	2	2	YES	Oncology	CC	Diagnosis	Medical
21	2	2	YES	Digestive	CC	Diagnosis	Medical
22	3	4	NO	Oncology	CC	PC	Medical
23	1	3	NO	Oncology	CC	Diagnosis	Medical
24	1	1	YES	Digestive	CC	Diagnosis	Medical
25	1	1	YES	Pneumology	CC	PC	Medical
26	2	2	YES	Nephrology	Test	PC	Medical
27	4	2	NO	Biochemistry and genetics	Test	Pathophysiology	Basic
28	3	3	YES	Biochemistry and genetics	Test	Pathophysiology	Basic
29	4	3	NO	Physiology	Negative	Pathophysiology	Basic

30	1	1	YES	Physiology	Negative	Pathophysiology	Basic
31	3	3	YES	Physiology	Test	Pathophysiology	Basic
32	2	1	NO	Physiology	Test	Pathophysiology	Basic
33	4	2	NO	Immunology	Negative	Pathophysiology	Basic
34	2	1	NO	Pneumology	Test	Pathophysiology	Basic
35	2	2	YES	Pneumology	Test	Treatment	Basic
36	4	4	YES	Immunology	Test	Pathophysiology	Basic
37	1	3	NO	Immunology	Test	Pathophysiology	Basic
38	4	4	YES	Immunology	Negative	Pathophysiology	Basic
39	3	3	YES	Digestive	CC	Treatment	Medical
40	3	4	NO	Digestive	Negative	Several	Medical
41	1	1	YES	Biochemistry and genetics	Test	Pathophysiology	Basic
42	2	2	YES	Biochemistry and genetics	Test	Pathophysiology	Basic
43	1	1	YES	Preventive	Test	Statistics	Preventive
44	2	2	YES	Preventive	Test	Statistics	Preventive
45	2	1	NO	Preventive	Test	Statistics	Preventive
46	2	1	NO	Preventive	Test	Statistics	Preventive
47	2	4	NO	Preventive	Test	Treatment	Preventive
48	2	2	YES	Preventive	Test	Statistics	Preventive
49	4	4	YES	Preventive	Test	Statistics	Preventive
50	4	4	YES	Preventive	Test	Treatment	Preventive
51	4	4	YES	Preventive	Test	Treatment	Preventive
52	3	3	YES	Preventive	Test	Statistics	Preventive
53	3	2	NO	Psychiatry	Test	Treatment	Preventive
54	2	2	YES	Pharmacology	CC	Treatment	Basic
55	3	3	YES	Pharmacology	Test	Pathophysiology	Basic
56	3	1	NO	Pharmacology	Test	Treatment	Basic
57	4	4	YES	Pharmacology	CC	Treatment	Basic
58	4	3	NO	Maxillofacial and ent	CC	Diagnosis	Surgical
59	2	2	YES	Maxillofacial	Test	Pathophysiology	Surgical

				and ent		ogy	
60	3	3	YES	Dermatology	Test	Diagnosis	Surgical
61	4	2	NO	Dermatology	Negative	Treatment	Surgical
62	4	4	YES	Ophthalmology	Test	Diagnosis	Surgical
63	3	3	YES	Ophthalmology	Test	Pathophysiol- ogy	Surgical
64	3	3	YES	Ophthalmology	CC	Diagnosis	Surgical
65	2	2	YES	Ophthalmology	CC	Diagnosis	Surgical
66	3	3	YES	Neurology	CC	Diagnosis	Medical
67	2	2	YES	Maxillofacial and ent	Test	Diagnosis	Surgical
68	2	1	NO	Gynecology	Negative	Several	Surgical
69	4	4	YES	Gynecology	Negative	Several	Surgical
70	1	4	NO	Gynecology	Test	Treatment	Surgical
71	2	2	YES	Gynecology	Test	Treatment	Surgical
72	4	4	YES	Gynecology	CC	Treatment	Surgical
73	1	1	YES	Gynecology	CC	Treatment	Surgical
74	2	2	YES	Urology	Test	Treatment	Surgical
75	4	4	YES	Gynecology	CC	Treatment	Surgical
76	3	2	NO	Gynecology	CC	Diagnosis	Surgical
77	2	3	NO	Pediatrics	Test	Treatment	Medical
78	1	3	NO	Pediatrics	Test	Diagnosis	Medical
79	1	2	NO	Pediatrics	CC	PC	Medical
80	1	1	YES	Pediatrics	Negative	Pathophysiol- ogy	Medical
81	3	1	NO	Psychiatry	Test	Several	Medical
82	2	3	NO	Digestive	Test	Several	Medical
83	4	4	YES	Pediatrics	Test	Diagnosis	Medical
84	2	1	NO	Pediatrics	Test	Treatment	Medical
85	4	1	NO	Pediatrics	CC	Treatment	Medical
86	1	3	NO	Pediatrics	CC	Diagnosis	Medical
87	4	4	YES	Psychiatry	Test	Treatment	Medical
88	3	3	YES	Psychiatry	Test	Treatment	Medical
89	3	4	NO	Psychiatry	CC	Diagnosis	Medical
90	4	4	YES	Psychiatry	Test	Diagnosis	Medical
91	2	1	NO	Psychiatry	Test	Diagnosis	Medical
92	2	2	YES	Psychiatry	Test	Treatment	Medical
93	4	1	NO	Psychiatry	Negative	Treatment	Medical
94	4	4	YES	Psychiatry	Test	Treatment	Medical
95	1	3	NO	Neurology	Test	Pathophysiol- ogy	Medical

96	2	3	NO	Neurology	Negative	Diagnosis	Medical
97	4	2	NO	Neurology	CC	Diagnosis	Medical
98	2	1	NO	Neurology	Test	Diagnosis	Medical
99	2	2	YES	Neurology	CC	Treatment	Medical
100	2	4	NO	Neurology	CC	PC	Medical
101	3	2	NO	Neurology	CC	Treatment	Medical
102	4	4	YES	Neurology	Test	Diagnosis	Medical
103	4	4	YES	Neurology	CC	Diagnosis	Medical
104	2	2	YES	Neurology	Test	Several	Medical
105	1	1	YES	Icu	CC	Treatment	Medical
106	3	3	YES	Icu	CC	Treatment	Medical
107	4	4	YES	Icu	CC	Treatment	Medical
108	4	3	NO	Traumatology	CC	Diagnosis	Surgical
109	2	2	YES	Traumatology	CC	PC	Surgical
110	1	1	YES	Traumatology	CC	Treatment	Surgical
111	3	3	YES	Traumatology	CC	Diagnosis	Surgical
112	2	1	NO	Traumatology	Test	Several	Surgical
113	2	2	YES	Traumatology	CC	Diagnosis	Surgical
114	4	4	YES	Traumatology	Test	Treatment	Surgical
115	1	1	YES	Rheumatology	CC	Diagnosis	Medical
116	3	1	NO	Rheumatology	CC	Treatment	Medical
117	2	1	NO	Rheumatology	CC	PC	Medical
118	2	4	NO	Rheumatology	Test	Diagnosis	Medical
119	4	2	NO	Cardiology	Test	Diagnosis	Medical
120	4	2	NO	Cardiology	Test	Diagnosis	Medical
121	3	3	YES	Cardiology	CC	Treatment	Medical
122	4	1	NO	Cardiology	Test	Several	Medical
123	4	4	YES	Cardiology	CC	Treatment	Medical
124	1	2	NO	Cardiology	CC	Treatment	Medical
125	4	4	YES	Cardiology	CC	PC	Medical
126	4	3	NO	Pneumology	CC	Treatment	Medical
127	1	4	NO	Pneumology	CC	Treatment	Medical
128	4	4	YES	Pneumology	CC	Diagnosis	Medical
129	1	4	NO	Pneumology	CC	Treatment	Medical
130	3	3	YES	Digestive	CC	Diagnosis	Medical
131	3	2	NO	Digestive	CC	Treatment	Medical
132	3	3	YES	Digestive	Test	Diagnosis	Medical
133	1	4	NO	Digestive	CC	Diagnosis	Medical
134	4	3	NO	Digestive	Negative	Several	Medical
135	3	2	NO	Rheumatology	CC	PC	Medical
136	2	2	YES	Nephrology	CC	PC	Medical

137	4	3	NO	Nephrology	CC	Diagnosis	Medical
138	4	3	NO	Urology	CC	Treatment	Surgical
139	2	2	YES	Nephrology	CC	Diagnosis	Medical
140	4	2	NO	Endocrinology	CC	Diagnosis	Medical
141	1	4	NO	Urology	Negative	Treatment	Surgical
142	1	1	YES	Urology	Test	Several	Surgical
143	3	3	YES	Oncology	Test	Treatment	Medical
144	3	3	YES	Oncology	Negative	Treatment	Medical
145	2	2	YES	Oncology	Test	Pathophysiology	Medical
146	1	1	YES	Oncology	Test	Treatment	Medical
147	2	3	NO	Hematology	CC	Treatment	Medical
148	1	1	YES	Hematology	CC	Several	Medical
149	3	3	YES	Hematology	CC	Diagnosis	Medical
150	2	2	YES	Hematology	CC	PC	Medical
151	3	1	NO	Geriatrics	Test	Pathophysiology	Medical
152	4	2	NO	Geriatrics	Test	PC	Medical
153	4	3	NO	Geriatrics	Test	Pathophysiology	Medical
154	1	4	NO	Geriatrics	Test	Treatment	Medical
155	2	2	YES	Geriatrics	Negative	Diagnosis	Medical
156	3	3	YES	Geriatrics	CC	Diagnosis	Medical
157	2	1	NO	Endocrinology	CC	PC	Medical
158	2	2	YES	Endocrinology	Negative	Several	Medical
159	3	3	YES	Endocrinology	Test	Treatment	Medical
160	1	1	YES	Endocrinology	CC	Diagnosis	Medical
161	2	2	YES	Endocrinology	CC	Diagnosis	Medical
162	3	4	NO	Endocrinology	CC	Several	Medical
163	4	1	NO	Endocrinology	Negative	Treatment	Medical
164	1	1	YES	Infectious	CC	Treatment	Medical
165	3	1	NO	Infectious	CC	Treatment	Medical
166	1	1	YES	Infectious	CC	Treatment	Medical
167	1	1	YES	Infectious	CC	Treatment	Medical
168	2	4	NO	Infectious	Test	Several	Medical
169	1	1	YES	Infectious	CC	Treatment	Medical
170	2	2	YES	Infectious	CC	Treatment	Medical
171	4	1	NO	Rheumatology	CC	Treatment	Medical
172	4	3	NO	Rheumatology	Test	PC	Medical
173	2	2	YES	Rheumatology	CC	Diagnosis	Medical
174	4	1	NO	Rheumatology	CC	Diagnosis	Medical

175	2	4	NO	Rheumatology	CC	Pathophysiology	Medical
176	2	4	NO	Rheumatology	Test	Pathophysiology	Medical
177	1	3	NO	Rheumatology	CC	Diagnosis	Medical
178	4	4	YES	Endocrinology	CC	Treatment	Medical
179	1	1	YES	Endocrinology	CC	Diagnosis	Medical
180	4	4	YES	Legal medicine and ethics	Test	Ethical and Legal	Ethics
181	3	3	YES	Legal medicine and ethics	CC	Ethical and Legal	Ethics
182	4	1	NO	Legal medicine and ethics	CC	Ethical and Legal	Ethics
183	3	3	YES	Legal medicine and ethics	CC	Ethical and Legal	Ethics
184	2	2	YES	Psychiatry	CC	Treatment	Medical
185	4	1	NO	Digestive	CC	Treatment	Medical
186	1	4	NO	Legal medicine and ethics	CC	Ethical and Legal	Ethics
187	3	4	NO	Legal medicine and ethics	Test	Ethical and Legal	Ethics
188	4	3	NO	Dermatology	Test	Several	Surgical
189	3	2	NO	Preventive	CC	Treatment	Preventive
190	3	3	YES	Endocrinology	CC	Diagnosis	Medical
191	3	2	NO	Oncology	CC	Diagnosis	Medical
192	4	1	NO	Cardiology	CC	Treatment	Medical
193	2	3	NO	Endocrinology	CC	Treatment	Medical
194	3	3	YES	Endocrinology	Test	Treatment	Medical
195	4	4	YES	Pharmacology	CC	Treatment	Basic
196	4	4	YES	Emergencies	Test	Treatment	Medical
197	2	2	YES	Emergencies	Test	Treatment	Medical
198	3	1	NO	Emergencies	CC	Diagnosis	Medical
199	3	3	YES	Emergencies	CC	Diagnosis	Medical
200	4	1	NO	Emergencies	CC	Treatment	Medical
201	4	3	NO	Oncology	Test	Diagnosis	Medical
202	2	2	YES	Nephrology	CC	Diagnosis	Medical
203	3	4	NO	Endocrinology	CC	Diagnosis	Medical
204	4	1	NO	Oncology	Test	Diagnosis	Medical
205	3	3	YES	Rheumatology	CC	Diagnosis	Medical
206	1	2	NO	Rheumatology	CC	Diagnosis	Medical
207	4	1	NO	Pneumology	Test	Several	Medical

208	3	3	YES	Pneumology	CC	Diagnosis	Medical
209	1	1	YES	Pneumology	CC	Diagnosis	Medical
210	4	4	YES	Cardiology	CC	Treatment	Medical