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“COVID-19: The final nail in the coffin for physical examination” Evaluation of the effects of COVID-19 pandemic on physical examination habits of residents in a university hospital: A cross-sectional survey

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Abstract

Aims: It is evident that the COVID-19 pandemic has affected the medical practice and training of residents. In this study, we evaluated the physical examination (PE) habits of residents working in a university hospital and how their PE practices did change during the pandemic.

Methods: This single-centre, non-interventional, cross-sectional descriptive study was conducted in a university hospital using an online survey questionnaire between 5 and 20 October 2020.

Results: Of the 308 residents who participated in the study, 172 of them (55.8%) were female and the median age was 27 (IQR (3) = Q1 (29)-Q3 (26)). Amongst all, 263 participants (85.4%) declared that they have worked in the areas where suspected/confirmed COVID-19 patients were being served. A total of 262 (85%) residents stated that PE habits have changed generally during the pandemic. There was a significant difference with regards to the change in PE habits between those residents who have worked in the COVID-19 areas ($n = 230, 87.5\%$) and those who have not ($n = 32, 71.1\%$) ($P = .004$). PE habits of Internal Medicine Residents were changed more than others ($P < .001$). The main reason for the change in PE habits in general (77.9%) and during the examination of suspected/confirmed COVID-19 patients (89.7%) were “self-protection.” Independent factors for limited PE in suspected/confirmed COVID-19 patients were found as “Avoiding performing physical examination to be exposed less/to protect (adjusted ORs = 13.067),” “relying on laboratory and radiological investigations during practice (adjusted ORs = 4.358),” and “not having a thought that reduced physical examination will render the diagnosis and course of COVID-19 (adjusted ORs = 2.244).”

Conclusions: This study clearly demonstrated that the COVID-19 pandemic has had a serious impact on the PE habits of the residents while examining patients in general and with COVID-19.

1 | INTRODUCTION

Coronavirus disease-2019 (COVID-19) has caused unprecedented changes in almost every aspect of our lives as it was declared to be a pandemic in March 2020.¹ Social distancing and lockdowns have had impacts not only on social life but also on education as institutions and universities all over the world have ceased face-to-face instruction. Although these measures helped to prevent the spread of the disease, they at the same time prohibited students and residents from gathering and interacting face-to-face in learning laboratories, lecture halls or small group rooms, and at the bedside.²

These challenges also brought possibilities for improvement. The major response to the social distancing needs of the pandemic has been searching for ways of interacting from a distance and teaching-learning-assessing through online platforms. In many sectors, these changes created new opportunities, as the initial response in the healthcare facilities was to search for ways of serving the patients from a distance. A rapid increase in the utilisation of telemedicine granted the advantages of continued medical care whilst adhering to strict social distancing and limiting mobility, and thus reducing the transmission of the infection.³

University and training hospitals have faced the challenge of being declared as pandemic hospitals, suffering from a shortage of personal protective equipment (PPE), and being run by burned-out healthcare workers. Reorganisation of the hospitals, restricting elective admissions and procedures, and diverting the physicians from every speciality to care for COVID-19 patients completely disrupted the maintenance of medical training and residency programmes.⁴

It is evident that the COVID-19 pandemic has affected the medical practice and training of residents. In this study, we evaluated the physical examination (PE) habits of residents working in a university hospital and how their PE practices did change during the pandemic.

2 | MATERIALS AND METHODS

2.1 | Study design and population

This single-centre, non-interventional, cross-sectional descriptive study was conducted in a tertiary care university hospital using an online survey questionnaire between 5 and 20 October 2020. All the residents in training working in the medical and surgical departments of the university hospital except for the basic science departments (such as Anatomy, Biophysics, Biostatistics, Physiology, etc) were invited. Electronic informed consent of all participants was obtained.

Residents were classified into three main groups. By virtue of their common education and training programme, and their shared work mainly in COVID-19 areas, residents who were trained at the departments of Internal Medicine, Infectious Diseases, Pulmonary Diseases and Cardiology were classified as "Internal Medicine group" (IM). Residents who were being trained at any department of child diseases were classified as "Paediatrics" (PED). The rest of the residents who were being trained at surgical and medical science departments were classified as "Others" (OTH).

What's known

- Physical examination is a ritual to physically connect with the patients and to demonstrate the physician's knowledge and authority. It is also a tool to persuade patients and reevaluate their narratives. Unfortunately, physical examination has become a vanishing art in the last decades.
- Time pressures, an increasing reliance on technology and limited opportunities for bedside teaching have contributed to the demise of the physical examination.
- The patient's history and PE are the most important elements in reaching the correct diagnosis. Laboratory tests and imaging studies often play a complementary role to confirm or refute the preliminary diagnoses.

What's new

- This study clearly demonstrated that the COVID-19 pandemic has had a serious impact on the PE habits of the residents while examining patients in general and with COVID-19.
- In the era of the COVID-19 pandemic, physicians perform fewer physical exams as a result of various problems such as the need for using personal protective equipment, time spent for donning and doffing, the pressure of caring for several COVID-19 patients, and the anxiety of being infected.
- This study has also demonstrated that the residents were actually performing limited physical examination even before the pandemic.
- This study contributes to the literature in terms of drawing attention to "physical examination," which is indispensable in residency training and medical practice.

2.2 | Study questionnaire

General information about the study and an electronic consent form was presented before the questionnaire. Only those who gave their consent had access to the survey. The questionnaire consisted of two parts. The first part included questions about socio-demographical characteristics including age, gender, training department and current place of practice. The second part included 20 questions probing insights on the changing PE habits. Question 1 asked the respondent if s/he has ever worked in COVID-19 areas. For affirmative responses, there were two follow-up questions (Questions 2 and 3) as "Have your physical examination habits changed during the COVID-19 pandemic?" and "Do you examine patients with suspected/confirmed COVID-19 in as much detail as those without a suspected/confirmed diagnosis of COVID-19?" respectively. The following questions were about systemic examinations. Physical examination habits for both

patients with suspected/confirmed COVID-19 (Questions 4-10) and in general (Question 11-17) before and after the pandemic were questioned separately for each system (head-neck, respiratory system, cardiovascular system, abdomen, genitourinary, skin/extremity and neurological systems, respectively). Question 18 was "What is/are the main reason/reasons for the change of your physical examination habits in general?" and Question 19 was "Why do you perform limited physical examination in suspected/confirmed COVID-19 patients?" Question 20 was asked to gather the opinion of the respondent on whether limited physical examination would impair the diagnosis and course of COVID-19.

The study protocol was approved by the Institutional Ethics Board (Approval number: 35853172-900, date: October 27, 2020) and carried out in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki as revised in 2000.

2.3 | Questionnaire administration

In this study, we utilised an online questionnaire to survey the residents working in the medical and surgical departments. Residents working in the basic science departments such as Anatomy, Biophysics, Biostatistics, Physiology, etc were not included. With the permission of the ethics committee, we obtained the phone numbers of the residents that we plan to approach from different departments and invited them by sending a short letter introducing our study and the link of the survey via message to their mobile phones. A 14-day period was granted to complete the questionnaire.

2.4 | Statistical analysis

In descriptive statistics, numbers and percentages were used for categorical variables. For continuous variables with normal distribution, mean and standard deviation (SD) were used; for continuous variables that do not show normal distribution, median and interquartile range (IQR = Q3-Q1) were given. The χ^2 test or Fisher's exact test was used to compare categorical variables. Factors affecting PE in COVID-19 patients or non-COVID patients were analysed using univariate and multivariate logistic regression analyses. Statistical analysis was performed using SPSS 22.0. *P* values presented at descriptive statistics, comparison studies and logistic regression models were two-sided and were considered statistically significant when below .05.

3 | RESULTS

3.1 | Basic characteristics of the study population

The questionnaire was sent to 688 residents. Excluding those who did not respond, or did not give their consent, 308 residents participated, bringing the response rate to 44.8%. One hundred and seventy two of these 308 participants (55.8%) were female

patients and the median age was 27 (IQR (3) = Q1 (29)-Q3 (26)). Nearly, half of all the participants in the whole study population and the majority of those who have worked in COVID-19 areas were in the IM group (Table 1). Amongst all, 263 participants (85.4%) declared that they have worked in the areas where suspected/confirmed COVID-19 patients were being served. The recent COVID-19 areas that they have worked were COVID-19 outpatient clinics ($n = 77, 29.3\%$), COVID-19 wards ($n = 93, 35.4\%$) and COVID-19 ICU ($n = 93, 35.4\%$).

Almost all of the IM group (94.6%) worked in the COVID-19 areas, and this ratio was significantly higher from PED and OTH groups (Table 2). Whilst the vast majority of the PED group worked in outpatient clinics (76.9%), the IM and OTH groups dealing with mostly adult patients worked in wards and ICUs (Table 2).

3.2 | COVID-19 impact on physical examination

A total of 262 (85%) residents stated that their PE habits have changed generally during the COVID-19 pandemic (Table 3). With regards to this question, there was a statistically significant difference in the change of PE habits between those residents who have worked in the COVID-19 areas and those who have not. In particular, 87.5% ($n = 230$) of residents who have worked in the COVID-19 areas reported that their PE habits have changed compared with 71.1% ($n = 32$) of residents who have not worked in COVID-19 areas ($P = .004$).

Most of the residents (75.6%) declared that they performed limited PE in suspected/confirmed COVID-19 patients in comparison with non-COVID-19 patients. The difference was more significant between those residents who have worked in the COVID-19 areas ($n = 205, 77.9\%$) and who have not ($n = 28, 62.2\%$) ($P = .023$).

Statistically different from PED and OTH groups, residents in the IM group stated that their PE habits have changed during the COVID-19 pandemic ($n = 161, 95.8\%, P \leq .001$) and they perform less thorough PE in patients with suspected cases of COVID-19 in comparison with non-COVID-19 patients ($n = 152, 90.5\%, P \leq .001$) (Table S1).

3.3 | Main factors that contribute to the impact of COVID-19 on physical examination habits

The main reason for the change in PE habits in general (77.9%) and during the examination of suspected/confirmed COVID-19 patients in particular (89.7%) were "self-protection." About 38.2% of participants reported that time spent with the use of PPE is one of the main reasons for the change of their PE habits in general, whilst 48.5% stated that this is one of the main reasons why they perform limited PE in suspected/confirmed COVID-19 patients (Table 3).

All statements (self-protection, time spent wearing PPE, considering that there are no specific physical findings, reliance on laboratory and radiological investigations and high numbers of patients)

Characteristics	Total n = 308	Those working in COVID-19 areas n = 263
Age, median (IQR)	27 (3)	27 (2)
Sex, n (%)		
Male patients	136 (44.2)	119 (45.2)
Female patients	172 (55.8)	144 (54.8)
Residency group, n (%)		
Internal medicine (IM)	168 (54.5)	159 (60.5)
Internal medicine	135 (43.8)	128 (48.7)
Infectious diseases	10 (3.2)	10 (3.8)
Pulmonary diseases	14 (4.5)	14 (5.3)
Cardiology	9 (2.9)	7 (2.7)
Paediatrics (PED)	50 (16.2)	39 (14.8)
Others (OTH)	90 (29.2)	65 (24.7)
Anaesthesiology	14 (4.5)	14 (5.3)
Emergency	11 (3.6)	11 (4.2)
Neurology	9 (2.9)	6 (2.3)
General surgery	9 (2.9)	2 (0.8)
Family medicine	7 (2.3)	4 (1.5)
Otorhinolaryngology	7 (2.3)	5 (1.9)
Neurosurgery	7 (2.3)	4 (1.5)
Obstetrics and gynaecology	6 (1.9)	5 (1.9)
Psychiatry	5 (1.6)	5 (1.9)
Urology	4 (1.3)	2 (0.8)
Radiation oncology	3 (1)	1 (0.4)
Orthopaedics and traumatology	2 (0.6)	2 (0.8)
Ophthalmology	2 (0.6)	2 (0.8)
Paediatric surgery	2 (0.6)	0 (0.0)
Dermatology	1 (0.3)	1 (0.4)
Physical therapy and rehabilitation	1 (0.3)	1 (0.4)

TABLE 1 Basic characteristics of participants

	Total	Internal medicine	Paediatrics	Others	P
Ever worked in the COVID-19 areas? (n = 308)					
No, n (%)	45 (14.6)	9 (5.4)	11 (22.0)	25 (27.8)	.001
Yes, n (%)	263 (85.4)	159 (94.6)	39 (78)	65 (72.2)	
In which COVID-19 area were you recently? (n = 263)					
COVID-19 outpatient clinics, n (%)	77 (29.3)	24 (15.1)	30 (76.9)	23 (35.4)	<.001
COVID-19 wards, n (%)	93 (35.4)	73 (45.9)	5 (12.9)	15 (23.1)	
COVID-19 ICU, n (%)	93 (35.4)	62 (39)	4 (10.3)	27 (41.5)	

TABLE 2 The percentage of participants who ever worked in the COVID-19 areas with regards to residency groups

Abbreviation: ICU, intensive care unit.

were statistically significant in terms of performing limited PE of suspected/confirmed COVID-19 patients (Table 3).

Regarding the question "Do you think performing limited physical examination affects the diagnosis and course of COVID-19?", 42.5% (n = 131) of the residents answered "no" and there was no

significant difference between those who have worked in COVID-19 areas (n = 115, 43.7%) and who have not (n = 16, 35.6%) (P = .332). There was no significant difference between the IM, PED, OTH groups in terms of considering that limited physical examination affects the diagnosis and course of COVID-19 (P = .372).

TABLE 3 Main factors that residents stated as contributing factors to the impact of COVID-19 on physical examination habits

	What is/are the main reason/reasons for the change of your physical examination habits in general? Total n = 262 n, (%)	Why do you perform a limited physical examination in suspected/confirmed COVID-19 patients? Total n = 233 n, (%)	P	χ^2 test (Yates correction)
I avoid performing physical examination to be exposed less/to protect myself	204 (77.9)	209 (89.7)	<.001	11.66
Putting on PPE ^a is too much time-consuming	100 (38.2)	113 (48.5)	.02	4.95
I do not think that there are specific physical findings of COVID-19, so there will be no need	66 (25.2)	84 (36.1)	.011	6.38
I mostly rely on laboratory and radiological investigations during practice	54 (20.6)	77 (33.0)	.002	9.17
The number of patients is too high to perform physical examination in every case	63 (24)	37 (15.9)	.03	4.60

^aPersonal protective equipment.

3.4 | System-specific physical examination habit changes

Each participant was asked to respond to the question of whether he/she was performing a specific course of PE before the pandemic, and whether she/he was still performing it during the pandemic.

A statistically significant difference was observed with regards to changing PE habits in all system-specific examinations except neurological examination in the IM group compared with PED and OTH groups (Table 4).

The OTH group did not seem to change as much as IM did; however, the choice "not performing examination before the pandemic" was higher in all types of system-specific PE except for genitourinary and neurological examinations. The smallest change was observed in the PED group to indicate that they carry on examining their patients persistently in the same way.

The majority of residents in IM and OTH groups performed limited PE in suspected/confirmed COVID-19 patients compared with non-COVID-19 patients. On the other hand, the residents in the PED group was consistently examining suspected/confirmed COVID-19 patients in system-specific PE, which was significantly different compared with those residents in the IM and OTH groups (Table 5).

It is evident that the PE habits of all the residents have changed more towards a much-limited examination whilst examining suspected/confirmed COVID-19 patients than in general (Table S2).

3.5 | Logistic regression analyses

It was observed that the age and gender of residents were not related to the change in PE habits, both in general and in COVID-19 patients. On the other hand, working in COVID-19 areas during the pandemic, avoiding performing PE to be exposed less/to protect, thinking that putting on PPE is too much time-consuming, thinking that there are no specific physical findings of COVID-19, not considering that limited PE will affect the diagnosis and course of COVID-19, relying on laboratory and radiological investigations during practice and a large number of patients were factors that seemed to be related to the change in PE habits (Tables S3 and S4).

In the multivariate logistic regression model, it is independently predicted that PE is significantly disturbed in IM and OTH groups compared with PED in general and in suspected/confirmed COVID-19 patients. Avoiding performing PE to be exposed less/to protect him/herself strongly predicts change in PE habits that is statistically significant (In general; OR = 7.694, $P \leq .001$, in suspected/confirmed COVID-19 patients; OR = 13.067, $P \leq .001$) (Table S4).

Reliance on laboratory and radiological investigations during practice and not considering that less PE will disrupt the diagnosis and course of COVID-19 were also independent risk factors for performing limited PE in suspected/confirmed COVID-19 patients (Table S4).

TABLE 4 System-specific physical examination habit changes in general and in each residency group

	I was not examining before the pandemic, and I am not examining now, either n (%)	I was examining before the pandemic, and I avoid examining now n (%)	I was examining before the pandemic, and I am still examining n (%)	P
Do you perform head-neck examination	49 (15.9)	158 (51.2)	101 (32.7)	
Internal medicine	26 (17.3)	95 (54.8)	47 (28)	.001
Others	23 (25)	37 (41.1)	30 (33.3)	
Paediatrics	0 (0)	26 (52)	24 (48)	
Do you perform respiratory system examination	39 (12.6)	117 (37.9)	152 (49.3)	
Internal medicine	6 (3.6)	86 (51.2)	76 (45.2)	<.001
Others	33 (36.7)	27 (30)	30 (33.3)	
Paediatrics	0 (0.0)	4 (8)	46 (92)	
Do you perform cardiovascular examination	52 (16.9)	117 (38)	139 (45.1)	
Internal medicine	8 (4.8)	92 (54.8)	68 (40.5)	<.001
Others	44 (48.9)	23 (25.6)	23 (25.6)	
Paediatrics	0 (0.0)	2 (4)	48 (96)	
Do you perform abdominal examination	55 (17.8)	93 (30.2)	160 (51.9)	
Internal medicine	19 (11.3)	76 (45.2)	73 (43.5)	<.001
Others	36 (40)	15 (16.7)	39 (43.3)	
Paediatrics	0 (0.0)	2 (4.0)	48 (96)	
Do you perform genitourinary examination	180 (58.4)	41 (13.3)	87 (28.2)	
Internal medicine	109 (64.9)	28 (16.17)	31 (18.5)	<.001
Others	54 (60)	9 (10)	27 (30)	
Paediatrics	17 (34)	4 (8)	29 (58)	
Do you perform skin and extremity examination	71 (23)	90 (29.2)	147 (47.7)	
Internal medicine	26 (15.5)	70 (41.7)	72 (42.9)	<.001
Others	40 (43.3)	15 (16.7)	35 (40)	
Paediatrics	5 (10)	5 (10)	40 (80)	
Do you perform neurological examination	116 (37.6)	79 (25.6)	113 (36.7)	
Internal medicine	70 (41.7)	47 (28)	51 (30.4)	.075
Others	31 (34.4)	17 (18.9)	42 (46.7)	
Paediatrics	15 (30)	15 (30)	20 (40)	

TABLE 5 System-specific physical examination habit changes whilst examining suspected/confirmed COVID-19 patients in each residency group

	I was not examining before the pandemic, and I am not examining now, either n (%)	I was examining before the pandemic, and I avoid examining now n (%)	I was examining before the pandemic, and I am still examining n (%)	P
Do you perform head–neck examination	58 (18.8)	209 (67.8)	41 (13.3)	
Internal medicine	33 (19.6)	132 (78.6)	3 (1.8)	<.001
Others	25 (27.8)	44 (48.9)	21 (23.3)	
Paediatrics	0 (0)	33 (66.0)	17 (34)	
Do you perform respiratory system examination	37 (12)	164 (53.2)	107 (34.7)	
Internal medicine	3 (1.8)	120 (71.4)	45 (26.8)	<.001
Others	34 (37.8)	36 (40)	20 (22.2)	
Paediatrics	0 (0)	8 (16)	42 (84)	
Do you perform cardiovascular examination	62 (20.1)	146 (47.4)	100 (32.5)	
Internal medicine	13 (7.7)	118 (70.2)	37 (22.2)	.001
Others	49 (54.4)	23 (25.6)	18 (20)	
Paediatrics	0 (0)	5 (10)	45 (90)	
Do you perform abdominal examination	52 (16.9)	133 (43.2)	123 (39.9)	
Internal medicine	17 (10.1)	107 (63.7)	44 (26.2)	<.001
Others	35 (38.9)	20 (22.2)	35 (38.9)	
Paediatrics	0 (0)	6 (12)	44 (88)	
Do you perform genitourinary examination	185 (60.1)	64 (20.8)	59 (19.2)	
Internal medicine	111 (66.1)	46 (27.4)	11 (6.5)	<.001
Others	55 (61.1)	14 (15.6)	21 (23.3)	
Paediatrics	19 (38.0)	4 (8.0)	27 (54.0)	
Do you perform skin and extremity examination	67 (21.8)	132 (42.9)	109 (35.4)	
Internal medicine	22 (13.1)	105 (62.5)	41 (24.4)	<.001
Others	40 (44.4)	18 (20)	32 (35.6)	
Paediatrics	5 (10.0)	9 (18.0)	36 (72.0)	
Do you perform neurological examination	118 (38.3)	104 (33.8)	86 (27.9)	
Internal medicine	76 (45.2)	77 (45.8)	15 (8.9)	<.001
Others	29 (32.2)	23 (25.6)	38 (42.2)	
Paediatrics	13 (26.0)	4 (8.0)	33 (66.0)	

4 | DISCUSSION

This study clearly demonstrated that the COVID-19 pandemic has had a serious impact on the PE habits of the residents whilst not only examining COVID-19 patients but also other patients in general. The main reason for this disruption was “self-protection.” Moreover, we have also demonstrated that residents were actually performing limited PE even before the pandemic. The case of residents in the PED group seemed to be an exception, as they seemed to perform a more thorough PE before the pandemic and more consistently carried on doing so.

Examination of the cardiovascular and respiratory system, along with the abdominal area, has been accepted *sine qua non* of many branches of medicine. In our study, most strikingly, the most significant decline was observed in the IM group, where the residents of this group were supposed to perform these basic examinations in daily practice. This change was not significant in the PED and OTH groups. It was determined that the PED group performed the systemic PE at similar rates consistently before and after the pandemic, whereas the OTH group did not perform systemic PE much before the pandemic and these habits continued after the pandemic as well. This situation might be explained by the principles set during paediatrics residency, the importance given to the holistic evaluation of the child and the fact that PE is sometimes the only clue as taking the anamnesis can be more difficult in children than the adult patient. It should also be kept in mind that because of the natural course of COVID-19, children were less likely affected by the disease and there has been no major disruption in the practice of the paediatrics residents, who have worked at a lower frequency in the COVID-19 areas.

Physical examination has become a vanishing art in the last decades. Hyman defined PE as a ritual to physically connect with patients, to demonstrate a physician's knowledge and authority and to be used as a tool to persuade patients and reevaluate their narratives.⁵ This ritual is also an experience in which the patient is willingly being examined by his/her doctor and is revealing what (s)he has not explained to anyone else before.⁶ Unfortunately, this holy ritual is neglected in the present-day medical practice and is mistakenly thought to be replaceable by a series of laboratory tests and high-tech machines. Evidently, the patient's history and PE are the most important elements in reaching the correct diagnosis. Laboratory tests and imaging studies often play a complementary role to rule in or rule out the preliminary diagnoses.

In the last decades, grand visits in patients' rooms where patients were examined by professors and juniors all together were replaced by computer-based visits without even seeing the patient that only laboratory and imaging examinations were discussed. Time pressure, an increasing reliance on technology and limited opportunities for bedside teaching have contributed to the demise of the PE. Even before the pandemic, many publications have described a deterioration in PE skills and habits amongst residents and faculty.⁷⁻¹¹ One of the main regrettable results that emerged in this study was that the rate of residents who said “I wasn't examining before the pandemic” which was

significantly evident amongst the other answers. It has been estimated that hospitalists spend <18% and internal medicine interns <12% of their time in direct patient care, but 40% of their time on computer-related tasks.^{12,13} Inadequacy of PE skills of internal medicine residents, especially in the respiratory system and in general, has also been objectively shown before.^{14,15} The self-protection response during the pandemic period may be justified. However, the findings of our study are alarming for the future of PE in the post-COVID era and worth discussing. The challenges of the pandemic and the reorganisation of healthcare delivery might lead to a major disruptive change from here on.

Although most medical schools have a structured curriculum to teach PE, training on PE skills is often lacking in residency programmes.⁸ Recently, the Medical Schools of Stanford and Yale Universities have been trying to reinforce PE as a part of preclinical didactic and clinical internships.¹⁶ There are also a few initiatives in the United States such as the US Medical Licensure Examination Clinical Skills Assessment Examination for students and objective structured clinical examinations (OSCEs) and standardised patients (SPs) as methods to evaluate residents.⁸

The groundbreaking Institute of Medicine report “To Err is Human” found that medical errors cause nearly 100 000 deaths per year.¹⁷ Poor PE skills are a serious threat to patient safety, as they can lead to misdiagnosis as well as leading to delays in the timely implementation of the essential treatments. Inadequate PE was shown to be the main cause of 208 medical errors and adverse events analysed with a rate of 63%. The consequence of the PE inadequacy included missed or delayed diagnosis in 76% of patients, incorrect diagnosis in 27%, unnecessary treatment in 18%, no or delayed treatment in 42%, the unnecessary diagnostic cost in 25%, unnecessary exposure to radiation or contrast in 17%, and complications caused by treatments in 4%.¹⁸ Moreover, a detailed history and thorough PE to guide the prudent use of technology will result in an enhanced physician–patient relationship, improved patient safety, less diagnostic error and lower financial cost.¹⁹

Unfortunately, the COVID-19 milieu has given a kick to already injured PE habits by leading to increased anxiety over “exposure risk” and to the increased instinct of self-protection. COVID-19 patients were isolated and entrance to patient rooms were limited extensively, as the patients were followed up by phone and video technologies almost without being examined at all.²⁰

In the present study, considering that there is no specific physical finding of COVID-19 and not having a thought that less PE will disrupt the diagnosis and course of COVID-19 seems to be related to changing PE habits in a negative manner. As the diagnosis of COVID-19 can be made with a positive PCR test and/or positive CT findings, auscultation of the lung sounds are perceived as not contributing to the management of especially mild–moderate patients.²¹

Effects of COVID-19 on the progressive use of telemedicine and the impossibility of performing a hands-on PE from a distance might have long-term consequences. Some insurance services in the

United States have temporarily dropped the PE as a requirement for billing purposes in telehealth appointments, recognising the difficulty of performing it virtually.¹⁶ In some other countries, doctors are under pressure from insurance companies to keep examinations brief.²² There is a risk that even after the pandemic, PE might be seen as an unnecessary component of patient evaluation and patient care might be based solely on technological tools.

Today, simulations are used for various purposes, including entertainment, education, training, system evaluation and research.²³ The medical simulation also allows the acquisition of clinical skills through hands-on practice. With the recent advancement in technology, simulation tools serve as an alternative to real patients, which allow trainees to perform procedural mistakes and learn from them without the fear of harming the patient.²⁴ During and after the pandemic, we should act with rapid technological reflexes and put the medical simulation on the front for resident training.

The current study has some limitations. The first limitation of this study is the difference in the number of residents in the residency speciality categories. However, we have tried to overcome this limitation by creating statistically strong models and showing independent risk factors for each group. A second limitation is the involvement of the residents in one single university hospital, so the results cannot be generalised. On the other hand, this is the first study to our knowledge to demonstrate the collateral damage of the pandemic on residency training and patient evaluation in Turkey.

We think that this study, by clearly demonstrating the devastating effects of COVID-19 on one of the indispensable skills of physicians, performing a PE, gives an opportunity for improvement in rearranging and adapting the residency training and working milieu with regards to the changing paradigm.

5 | CONCLUSION

This study clearly demonstrated the significant untoward effects of the COVID-19 pandemic on the PE habits of the residents not only whilst examining the COVID-19 patients but also other patients in general. A significant proportion of the residents stated that PE habits have changed generally during the COVID-19 pandemic and declared that they performed limited PE in suspected/confirmed COVID-19 patients in comparison with non-COVID-19 patients. Alternative strategies to develop and maintain PE skills of the residents and to improve the safety of the patients should be sought. Residency training programmes should be re-evaluated in the light of these findings. Otherwise, the COVID-19 will be the final nail in the coffin for physical examination.


DISCLOSURES

The authors declare that they have no financial and non-financial competing interests and they have also no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available because of privacy or ethical restrictions.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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