

# Scientific Reports in Medicine

## Research Article

### The effect of emergency medicine internship on the knowledge levels of intern physicians on approaching emergency medical situations

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#### Abstract

**Objective:** In this study, it was aimed to investigate the knowledge levels of intern physicians regarding the approach to emergency conditions and the impact of the emergency medicine internship on these knowledge levels.

**Method:** This study evaluated the approach and knowledge levels of 154 volunteer intern physicians to emergency conditions using 40 case-based questions. These questions were derived from common, essential, and treatment-requiring cases in emergency medicine. The questions, which included topics such as basic and advanced life support, ECG arrhythmia interpretation, radiography and tomography imaging, and critical patient diagnosis and treatment, were prepared by our team in accordance with the 2020 National Core Education Program (UÇEP) guidelines.

**Results:** Among the 154 students who voluntarily participated in the study, a statistically significant increase in knowledge levels was observed in 37 out of 40 questions after the emergency medicine internship. For the remaining three questions, knowledge levels improved but not to a statistically significant extent. Notably, significant improvements were observed in ECG interpretation, advanced life support, and the approach to critical patients.

**Conclusion:** This study demonstrated that intern physicians had insufficient knowledge in approaching emergency conditions prior to the emergency medicine internship, but their knowledge levels improved significantly after the rotation. However, it was concluded that the duration of the emergency medicine internship is insufficient for preparing interns to work as general practitioners in emergency departments, or more effective educational activities should be implemented during this period.

**Keywords:** Intern Physician, Emergency Medicine, Internship, Medical Education

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## INTRODUCTION

The emergency medicine internship is a crucial rotation that provides medical students with knowledge, skills, and experience in the management of emergency conditions while also offering significant gains for their future medical careers. During the emergency medicine internship, students have the opportunity to evaluate patients with a wide variety of clinical presentations (1,2). The management of emergency conditions requires not only knowledge, skills, and experience but also patience, composure, and courage. Today, the majority of medical school graduates in our country are assigned to emergency medicine clinics. In some cases, they are required to work alone on-call in rural areas. The emergency medicine internship in our country and worldwide is typically a two-month rotation during the final year of medical education; however, this duration is insufficient to achieve all the intended learning outcomes. Therefore, it is necessary to implement specialized educational activities that can engage and interest intern physicians during their emergency medicine training.

Some studies have shown that final-year medical students feel inadequate in terms of professional skills, clinical scenarios, symptom management, and the knowledge and skills targeted by the National Core Education Program (UÇEP) (3). For this reason, initiatives have been undertaken in recent years to improve the quality of medical education, and a national core education program (UÇEP) has been established to ensure standardized training across institutions (3,4).

This study aimed to evaluate the approach of intern physicians who have just begun their

internship to emergency conditions and their ability to diagnose critically ill patients. The knowledge levels of intern physicians at the beginning and end of their rotation regarding critical patient scenarios they may encounter in general practice, imaging interpretation, electrocardiography evaluation, and the application of basic and advanced life support were assessed. Through this, the role of the emergency medicine internship in enhancing their knowledge levels was investigated.

## METHOD

This study is a descriptive research study. It includes 154 final-year medical students who completed their internship at Kırşehir Ahi Evran University between 2022 and 2024. Ethical approval for the study was obtained from the Kırşehir Ahi Evran University Faculty of Medicine Clinical Research Ethics Committee on 22.06.2021, with approval number 2021-11/133. Participation in the study was based on voluntary consent. Prior to the implementation, participants were informed about the study through an informed consent form, and written consent was obtained from the students.

Data was collected at the beginning and end of the emergency medicine internship during the 2022-2024 academic year through face-to-face testing using 40 case-based questions. The questions were designed in accordance with the clinical learning objectives outlined in the National Core Education Program (UÇEP). They included scenarios frequently encountered in the emergency department, which are critically important and must be well understood by emergency physicians.

The study began by preparing 40 critical patient case questions (**Table 1**).

**Table 1. Questions asked to intern physicians**

No.	Question
1	During your shift in the emergency department of a district state hospital, a 26-year-old woman develops symptoms such as tongue swelling, throat swelling, and shortness of breath following a penicillin injection. What is the first medication you will administer, and what are the appropriate dosages?
2	A nurse in the emergency department obtains an ECG for a patient. Based on the ECG findings provided, what diagnosis would you consider?
3	A nurse in the emergency department obtains an ECG for a patient. Based on the ECG findings provided, what diagnosis would you consider?
4	A patient presents to the emergency department with complaints of palpitations and shortness of breath. The nurse obtains an ECG. Based on the ECG findings, what diagnosis would you consider?
5	What pharmacological treatment would you recommend for the patient described in Question 4?
6	A 26-year-old male patient presents to the emergency department with palpitations. The nurse obtains an ECG. Based on the ECG findings, what is your primary diagnosis?
7	What is the first-line intervention for the patient described in Question 6?
8	A patient presents to the emergency department with syncope and hypotension. The ECG findings are provided. What is your preliminary diagnosis?
9	A patient presents to the emergency department with a severe headache, blood pressure of 170/100 mmHg, and persistent nausea and vomiting. What is your initial diagnosis, and what diagnostic test would you order?
10	A patient presents to the emergency department with a headache. A tomography image is provided. What is your diagnosis?
11	A 23-year-old male patient presents to the emergency department with sudden-onset chest pain and shortness of breath that began 20 minutes ago. A chest X-ray is provided. What is your primary diagnosis?
12	A 22-year-old male patient sustains a head injury after falling from a height. A brain tomography scan is provided. What is your diagnosis?
13	A 74-year-old patient loses consciousness after a fall at home. A tomography scan is provided. What is your diagnosis?
14	You are attempting to intubate a critically ill patient in a district hospital. The patient has severe trismus (jaw clenching). Which medication and dosage would you administer to facilitate intubation?
15	A patient presents to the emergency department with tachypnea (40 breaths per minute) but stable vital signs. What is the first diagnostic test you would order?
16	A patient presents to the emergency department with respiratory distress and agitation. After administering 5 mg of morphine, the patient experiences respiratory arrest. Which antidote should you administer alongside intubation?
17	A trauma patient is administered 5 mg of midazolam intravenously for sedation prior to tomography. The patient suddenly stops breathing. Which antidote should be administered in addition to initial resuscitation measures?
18	A patient in the emergency department suddenly develops convulsions, cyanosis, and respiratory arrest. What is your preliminary diagnosis, and what steps would you take for differential diagnosis?
19	What is the first action to take if a person exhibits symptoms of respiratory obstruction while eating?
20	Where should chest compressions be applied during cardiopulmonary resuscitation (CPR) in adults?
21	How much should the sternum be depressed during chest compressions in adult CPR?
22	What is the correct recovery position for an unconscious patient?
23	What is the recommended ratio of rescue breaths to chest compressions during adult CPR?
24	What is the sequence of actions for providing first aid to an unconscious adult found lying motionless on the ground?
25	If CPR is performed without rescue breaths, what is the recommended rate of chest compressions?
26	What is the sequence of actions for rescuing a drowning child who is unconscious and not breathing?
27	What should be done for an unconscious person with a completely obstructed airway?

**Table 1. Questions asked to intern physicians**

No.	Question
28	Which of the following statements about cardiac massage is incorrect?
29	Which of the following statements about basic life support for infants and children is incorrect?
30	A patient with a myocardial infarction is brought to the emergency department after receiving CPR for 2 minutes. The patient has no pulse, and the following rhythm is observed on the monitor. What is the next step in management?
31	A 54-year-old male patient presents to the emergency department with sudden-onset chest and back pain lasting 1 hour. He has a history of hypertension, but his ECG is unremarkable. A chest X-ray is provided. What is your primary diagnosis?
32	A patient involved in a traffic accident presents with head, thoracic, and abdominal lacerations and pain. While awaiting blood results and radiology interpretation, the patient deteriorates. Based on the tomography images provided, what is your primary diagnosis?
33	A 74-year-old female patient is brought to the emergency department after a fall at home. A radiograph is provided. What is your preliminary diagnosis?
34	A 37-week pregnant patient presents to the emergency department with abdominal pain and suddenly develops seizures. What is your preliminary diagnosis, and what is the first-line treatment?
35	A 67-year-old male patient presents to the emergency department with weakness, poor general condition, and hyperventilation. ECG and venous blood gas results are provided (pH: 7.22, HCO <sub>3</sub> : 11, PO <sub>2</sub> : 58, Sat O <sub>2</sub> : 64, Na: 146, Ca: 1.16, K: 6.8, glucose: 132 mg/dL). What is your initial diagnosis, and what treatment should be initiated?
36	A patient presents to the emergency department after a fall. A radiograph is provided. What is your diagnosis?
37	A 38-year-old female patient presents with sudden, severe lower abdominal pain, cold sweats, nausea, and vomiting. She has no significant medical history. Physical examination reveals tenderness, guarding, and rebound in the lower abdomen. Vital signs and laboratory results are provided (BP: 90/65 mmHg, Pulse: 96/min, Temp: 36.7°C, Sat O <sub>2</sub> : 98%, WBC: 14,800/mm <sup>3</sup> , Hb: 8.7 g/dL, Platelets: 265,000/mm <sup>3</sup> , ALT: 18, AST: 29, BUN: 34, Cr: 0.98, CRP: 0.8). What are the two most likely diagnoses?
38	A patient treated for constipation in the emergency department returns with severe abdominal pain and subsequently experiences cardiac arrest. An abdominal tomography is provided. What is the most likely cause of cardiac arrest in this patient?
39	A 32-year-old female patient presents to the emergency department with fatigue, nausea, and worsening abdominal pain over 4 days. She has a history of moderate-severe persistent asthma but has been non-compliant with her medications. Vital signs and laboratory results are provided (BP: 86/53 mmHg, Pulse: 100/min, Temp: 35.9°C, WBC: 2000/mm <sup>3</sup> , Na: 126 mmol/L, K: 5.8 mmol/L, Glucose: 63 mg/dL). What is the most likely clinical condition, and what treatment should be initiated?
40	A patient with a history of hypertension and diabetes mellitus is presented to the emergency department after a sudden fall at home 4 hours ago. Physical examination reveals right-sided hemiparesis and slurred speech. Blood pressure is 180/100 mmHg. Two radiological images are provided. What imaging modalities are used, and what are their purposes? What is the patient's diagnosis, and how would you manage the current blood pressure?

On the first day of their emergency medicine internship, a pretest for all interns using these questions was administered, ensuring that both the questions and answers remained confidential. Subsequently, the same questions were reapplied at the end of the emergency medicine internship to assess the increase in knowledge among the physician candidates. These test questions were

administered to each intern group over three years, and strict confidentiality of the questions was maintained. During the emergency medicine internship, regular training sessions were conducted for residents. Additionally, training to interns on fundamental topics was provided; however, no training was conducted on these specific questions or their answers for any intern group. The test

questions aimed to achieve two objectives: first, to determine students' level of knowledge regarding the approach to emergency conditions over the five years, and second, to enhance their motivation to learn about emergency conditions by demonstrating the critical patient scenarios they would encounter immediately after graduation.

### Statistical analysis

The data were analyzed using the SPSS 21 program. The data are presented as mean, standard deviation, median, number, and percentage. The Kolmogorov-Smirnov test was used as the normality test. Parametric tests were used for data that followed a normal distribution, while non-parametric tests were preferred for data that did not follow a normal

distribution. In the analyses, the McNemar test and Wilcoxon test were used. A p-value of <0.05 was considered statistically significant.

## RESULTS

When comparing the intern physicians' correct answer rates on the pre-training pre-test and post-training post-test, a statistically significant increase in correct answers was observed for all questions except questions 1, 27, and 33 (Table 2).

A statistically significant increase was also found when comparing the overall correct answer rates of the intern physicians in the pre-training pre-test and post-training post-test. The effect size of the training was determined to be very large.

Table 2. Comparison of response distributions before and after training

Questions	Pre-test correct answer rate		Post-test correct answer rate		P
	n	%	n	%	
Q1	125	81.2	138	89.6	,281
Q2	132	85.7	151	98.1	,004 <sup>c</sup>
Q3	114	74.0	152	98.7	,000 <sup>c</sup>
Q4	45	29.2	125	81.2	,000
Q5	36	23.4	129	83.8	,000
Q6	35	22.7	141	91.6	,000
Q7	33	21.4	141	91.6	,000
Q8	80	51.9	145	94.2	,000
Q9	121	78.6	152	98.7	,000 <sup>c</sup>
Q10	70	45.5	145	94.2	,000
Q11	101	65.6	147	95.5	,000
Q12	105	68.2	147	95.5	,000
Q13	99	64.3	149	96.8	,000
Q14	9	5.8	50	32.5	,000 <sup>c</sup>
Q15	89	57.8	141	91.6	,000
Q16	21	13.6	135	87.7	,000
Q17	9	5.8	114	74.0	,000 <sup>c</sup>
Q18	9	5.8	75	48.7	,000
Q19	123	79.9	135	87.7	,040
Q20	130	84.4	147	95.5	,001
Q21	130	84.4	150	97.4	,000 <sup>c</sup>
Q22	146	94.8	152	98.7	,000 <sup>c</sup>
Q23	149	96.8	152	98.7	,063 <sup>c</sup>
Q24	55	35.7	96	62.3	,000
Q25	135	87.7	149	96.8	,001 <sup>c</sup>

Table 2. Comparison of response distributions before and after training

Questions	Pre-test correct answer rate		Post-test correct answer rate		p
	n	%	n	%	
Q26	76	49.4	115	74.7	,000
Q27	115	74.7	124	80.5	,112
Q28	128	83.1	143	92.9	,008
Q29	62	40.3	99	64.3	,000
Q30	29	18.8	102	66.2	,000
Q31	74	48.1	112	72.7	,000
Q32	70	45.5	146	94.8	,000
Q33	151	98.1	152	98.7	,500 <sup>c</sup>
Q34	62	40.3	134	87.0	,000
Q35	57	37.0	130	84.4	,000
Q36	144	93.5	152	98.7	.008c
Q37	53	34.4	115	74.7	,000
Q38	35	22.7	126	81.8	,000
Q39	12	7.8	64	41.6	,002c
Q40	82	53.2	137	89.0	,000
<sup>c</sup> Mc Nemar test					

As can be understood from the responses given by the intern physicians, they initially demonstrated good performance in basic life support questions,

which they frequently encountered during the first five years. However, it was observed that their knowledge levels further increased after the emergency medicine internship (Table 3).

Table 3. Comparison of pretest and post-test total correct answer numbers

	N	Mean	Std. Deviation	Min.	Max.	25th	50 <sup>th</sup> (Median)	75th	p	Cohen's d
Pretest total	154	21.11	5,051	8	34	17.00	21.00	24.25	<0.001*	6.13
posttest total	152	33.36	3,341	21	38	32.00	34.00	36.00		
*Wilcoxon test										

While they generally had a good level of knowledge in imaging-related questions, their knowledge levels in ECG-related questions were initially very low but showed a significant improvement after the emergency medicine internship.

## DISCUSSION

The internship year, which constitutes the final year of medical school, is an observational and predominantly practical process. During the internship, formal examinations are not typically conducted; however, the interns' attitudes, knowledge, and skills are evaluated, along with their

adherence to good medical practices.

In Türkiye, the majority of intern physicians aim to specialize in a specific field after graduation (5). Driven by the goal of passing the specialization exam, many prefer to spend this period studying rather than gaining clinical experience. However, they should not neglect rotations such as the emergency medicine internship, which provides valuable clinical exposure. Studies by Akman et al. and Kaygusuz et al. (1,5) have indicated that the majority of intern physicians prioritize studying for the specialization exam over gaining clinical experience, resulting in low levels of clinical skill acquisition. This situation

leads to interns graduating without fully benefiting from clinical rotations and subsequently facing significant challenges when assigned to emergency departments.

In their study, Kaygusuz et al. (5) reported that final-year students did not feel confident in performing procedures such as intubation and advanced cardiac life support. Özvarış et al. (6) found that while final-year students had adequate theoretical knowledge, they needed more opportunities to practice and apply their skills. In a study by Tortum et al. (7) on the approach of intern physicians to emergency conditions, it was noted that interns' knowledge of anaphylaxis management increased from 39% before the internship to 95% after the internship. In our study, we observed that interns' knowledge of anaphylaxis increased from 81% before the internship to 90% afterward. We attribute this improvement to the strong emphasis placed on anaphylaxis during their first five years of training.

Hartman et al. (8) highlighted in their study that as physicians gain more clinical experience, their ability to interpret ECGs improves. Burns et al. (9) noted that the lack of a robust ECG training program in medical education results in interns being inadequately prepared in this area. Similarly, this study found that interns had insufficient basic ECG knowledge at the beginning of the rotation but demonstrated significant improvement in recognizing critical ECG findings by the end of the emergency medicine internship.

Two studies in the literature (10,11) have shown that ECG simulator-based training significantly improves knowledge levels. Although ECG simulators were not used in our emergency department, training sessions to ensure that interns could recognize essential arrhythmias were organized. As a result, we observed a notable increase in ECG knowledge levels in our study. This study represents a rare type of research in the literature, with the primary goal of ensuring that intern physicians are well-trained.

## Limitations of the study

This study has several limitations, including being conducted at a single center, using a limited number of questions, and not including a practical examination component.

## CONCLUSION

It was determined that intern physicians had insufficient knowledge in electrocardiography interpretation and diagnosing critical conditions before the emergency medicine internship, while their theoretical knowledge of imaging interpretation and basic life support was at a good level. However, it was observed that the emergency medicine internship significantly improved their knowledge levels in many areas. Providing high-quality training during the emergency medicine internship dramatically contributes to their competence as general practitioners.

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Double blind both externally and Internally Peer Reviewed

### Conflict of Interest

The authors declare that they have no conflict of interests regarding content of this article..

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### Ethical Declaration

Ethical approval was obtained from Kırşehir Ahi Evran University, Medical Faculty Clinical Research Ethical Committee with date 22.06.2021 and number 2021-11/133, and Helsinki Declaration rules were followed to conduct this study.

## Authorship Contributions

Concept: HMÇ, OJ, Design: HMÇ, OJ, Supervising: HMÇ, Financing and equipment: OJ, Data collection and entry: HMÇ, OJ, Analysis and interpretation: HMÇ, OJ, Literature search: OJ, Writing: HMÇ, Critical review: OJ

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