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Journal of Medical Education and Family Medicine

ABOUT

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Journal of Medical Education and Family Medicine publishes research article, review article, rare case reports, and letter to the editor articles that will contribute to the medical education and family medicine. The main purpose of the journal is to disseminate the scientific knowledge produced in the field of medical education and family medicine to a wide platform.

Medical Education: The journal covers a broad spectrum of topics related to medical education, the developments in teaching approach, including innovative teaching methodologies, curriculum development, assessment strategies, and educational technology in medical training. Articles may explore the challenges and advancements in undergraduate and postgraduate medical education, as well as continuing professional development for healthcare practitioners.

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The target audience of the journal includes academicians, clinical researchers, medical/health professionals, students, and related professional and academic bodies and institutions.

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Journal of Medical Education and Family Medicine

EDITORIAL

Dear Readers,

We are pleased to present the first issue of the **Journal of Medical Education and Family Medicine** for 2025, featuring a wide range of research that highlights key developments in medical education and family medicine. This issue showcases thought-provoking studies spanning various fields, from the impact of digital content on medical professionals to the innovative use of artificial intelligence in interprofessional education.

This issue includes a critical review of COVID-19 positive patients with ST-segment elevation myocardial infarction, providing insights into the overlap of cardiovascular emergencies and pandemic care. We also cover key topics like clinical reasoning development, and improving clinical clerkship assessments.

We hope that these studies contribute to the body of knowledge and literature in medical education and family medicine.

Sincerely

Prof. Dr. Yasemin ÇAYIR

Assoc Prof. Esra ÇINAR TANRIVERDİ

Editor-in-Chief

Journal of Medical Education and Family Medicine



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Is YouTube Content Useful for Doctors at Different Career Stages?

ABSTRACT

Objective: Online-based educational programs are important tools in medical education today. Platforms such as YouTube can be used not only for entertainment but also for educational purposes. However, is the information on these platforms educational for medical people at different levels?

Methods: The 100 most-viewed videos were identified by typing the term “colposcopy” in the YouTube search bar, and after fulfilling the exclusion criteria, the number of views, number of likes, video duration, type of content, and source of the uploader were recorded. The reliability of the information in the videos was assessed via the Journal of the American Medical Association (JAMA) benchmark score, and the quality of education was assessed via the Global Quality System (GQS). The videos were then viewed by a medical student who had completed an obstetric internship, an obstetric resident and a postresident obstetrician and asked whether they had found the videos.

Results: When the criteria were applied, 62 videos were included in the review. The videos had a GQS of 2.5 ± 1.2 and a JAMA score of 2.1 ± 1.1 . The medical students reported that 61.3% of the videos were educational, whereas the obstetric residents reported that 53.2% were educational. The postresident obstetrician reported that only 4.8% were educational. The videos uploaded by the medical group were significantly more educational and more reliable.

Conclusion: YouTube videos are important resources for medical education. However, watching videos from reliable sources is more beneficial for education.

Keywords: Medical Education, YouTube, Educational Video

INTRODUCTION

The methods of learning have evolved significantly over time. For centuries, knowledge was transmitted primarily through books and teachers. Today, however, online-based learning platforms such as Khan Academy, Udemy, and MasterClass facilitate the rapid dissemination of reliable information. Freely accessible social media platforms such as YouTube, Twitter and Instagram are also frequently used for educational purposes. In an age in which internet use is ubiquitous, social media and video platforms are no longer just for entertainment but are also valuable sources of education and information. A meta-analysis indicated that approximately 20% of medical students use social media platforms to access educational content.¹ Moreover, one study reported that a significant proportion of young urologists surveyed reported using YouTube rather than reference books to learn surgical techniques and prepare for surgeries.² Owing to its low cost, social media has proven to be an ideal medium for disseminating information.³ YouTube, the largest internet-based visual information and entertainment platform, records over 2 billion daily views.⁴ However, because videos uploaded to YouTube are not subject to peer review, content is often posted without verification of its accuracy or validity. As a result, misinformation can be widely disseminated.

Both the millennial and Generation Z generations are particularly active in using social media to acquire new knowledge.⁵ The visual educational capabilities of YouTube are significant, with 91% of its audience between the ages of 18 and 29.⁶ It is reasonable to predict that as these generations enter medical school and residency programs, they will increasingly rely on social media for education, especially in fields such as radiology and surgery, where visual instruction is critical.

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Colposcopy is an essential procedure for detecting precancerous lesions in women whose tests are positive during cervical screening.⁷ The technique involves staining the cervix with acetic acid, followed by microscopic examination and biopsy of suspicious areas.⁸ The ability to perform the procedure with proficiency necessitates visual training to discern specific staining patterns. To this end, the International Agency for Research on Cancer has developed the freely accessible "Atlas of Colposcopy"

METHODS

The YouTube algorithm makes suggestions on the basis of viewing history. A new YouTube account was created to ensure unbiased video recommendations, and the site was accessed via the web browser's incognito mode. The term "colposcopy" was entered into the YouTube search bar, and the top 100 most-viewed videos as of August 2024 were filtered and analyzed. Only English-language videos with acceptable sound and image quality were considered. The exclusion criteria included videos in languages other than English, videos without sound or images and videos unrelated to colposcopy. The duration, number of likes and number of views were recorded for each eligible video. The videos were categorized into four groups on the basis of their content: surgical technique, personal experience, information about procedures or diseases and commercial content. The sources of the videos were categorized as academic (authors affiliated with a university or teaching hospital), physician, patient or commercial.

The videos were reviewed by a gynecologist, an obstetric resident and a medical student who participated in the colposcopy procedure as observers who had completed an obstetric internship. After watching all the videos one time, they were asked to judge whether the videos were educational. The accuracy and reliability of the videos were assessed via the

RESULTS

After applying the criteria, 62 videos were included in the analysis. The median duration of the videos was 307 seconds, and the median number of views was 97. The sources of the videos

to assist in the acquisition of these fundamental competencies.⁹ Given the visual nature of YouTube, we postulated that it could serve as an optimal setting for colposcopy education. The objective of our study is to assess the role of YouTube, in terms of educational accuracy and reliability, in the training of healthcare professionals at various stages of their careers in the field of colposcopy, which necessitates visual and surgical abilities as well as theoretical knowledge.

Journal of the American Medical Association (JAMA) benchmark score proposed by Silberg, which includes four criteria.¹⁰ The educational quality of the videos was assessed via the Global Quality System (GQS), which is graded on a scale of 1--5.¹¹ These tools have been validated as methods for evaluating information quality on the internet. The Jama score is used to evaluate 4 domains: authorship, attribution, disclosure and current content.¹⁰ Each domain receives 1 point, and the total score is 4. The Jama score reflects the reliability and accuracy of the content rather than its quality. The GQS score is a tool that is evaluated out of 5 points and measures the educational quality of the content.¹¹ Each video was rated according to these two systems.

Since publicly available data were used, ethics committee approval was not needed.

Statistical Analysis

The means, standard deviations, medians, minimums, maximum value frequencies and percentages were used for descriptive statistics. The distribution of variables was checked with the Kolmogorov–Smirnov and Shapiro–Wilk tests. The Mann–Whitney U test was used for the comparison of quantitative data. The chi-square test was used for the comparison of the group data. Significance was defined as $P < .05$. SPSS version 27.0 (IBM SPSS Corp., Armonk, NY, USA) was used for the statistical analyses.

were as follows: 5 were uploaded by academic institutions, 28 by physicians, 1 by a patient, and 18 by commercial entities. In terms of content, 37 videos provided information about the colposcopy procedure. The descriptive data are summarized in Table 1.

Table 1. Destructive Data's of Videos

		Min–Max		Median	Mean±SD/n-%			
Time (minute)		28.0	-	18000.0	307.0	934.5	-	2498.4
Views (x10 ³)		10.0	-	2300.0	37.5	97.0	-	291.5
Likes		0.0	-	3200.0	194.0	391.5	-	582.8
GQS Score		1.0	-	5.0	2.0	2.5	-	1.2
JAMA Score		1.0	-	4.0	2.0	2.1	-	1.1
Source	Academic					5		8.1%
	Physician					28		45.2%
	Patient					11		17.7%
	Commercial					18		29.0%
	Surgical Technic					10		16.1%
Content	Information					37		59.7%
	Personal Experience					12		19.4%
	Commercial					3		4.8%
Educational Content								
Postresident	(+)					3		4.8%
	(-)					59		95.2%
Resident	(+)					33		53.2%
	(-)					29		46.8%
Student	(+)					38		61.3%
	(-)					24		38.7%

JAMA: Journal of the American Medical Association; GQS: Global Quality System; SD: standart deviation

With respect to educational content, 38 medical students, 33 residents, and 3 postresidents found the videos educational. The video uploaders were categorized into two groups: the "medical group" (academic and physician sources) and the "nonmedical

group" (commercial and patient sources). The medical group had significantly higher GQS and JAMA scores ($P < .05$) and was superior in terms of educational content (Table 2).

Table 2. Educational Quality and Reliabiliy Scores

		Non-Medical (n:29)			Medical (+) (n:33)			P	
		Mean±sd/n-%		Median	Mean±SD/n-%		Median		
GQS Score		1.8	±	1.0	1.0	3.0	±	1.0	.000 ^m
JAMA Score		1.6	±	0.8	1.0	2.5	±	1.1	.000 ^m
Post Resident	(+)	0		.0%	3		9.1%		
	(-)	29		100.0%	30		90.9%		.241 ^{x²}
Resident	(+)	8		27.6%	25		75.8%		
	(-)	21		72.4%	8		24.2%		.000 ^{x²}
Student	(+)	12		41.4%	26		78.8%		
	(-)	17		58.6%	7		21.2%		.003 ^{x²}

^m Mann-whitney u test / ^{x²} Chi-square. JAMA: Journal of the American Medical Association; GQS: Global Quality System; SD: standart deviation

DISCUSSION

Video-based training has become an important tool for improving the acquisition of surgical and clinical skills by healthcare professionals.¹² Video-based learning offers several advantages, especially for surgical techniques where visual learning is essential. In addition, video-based platforms enable

internet-based training, which has proven invaluable during the COVID-19 pandemic when face-to-face teaching is limited. In addition, increasing restrictions on working hours, particularly in specialty training, have reduced the time available for practical training. In surgical specialties, where the mentor–apprentice relationship is crucial, the reduced training hours can be partially

offset by the use of surgical videos on platforms such as YouTube. For example, a study demonstrated that general surgery residents who watched colectomy videos before surgery performed the procedure more successfully than those who did not watch videos.¹³ This and similar studies highlight the value of video resources such as YouTube in surgical education. In our study, we observed that residents and medical students, who were still in the process of learning, found YouTube videos useful educational tools. In contrast, individuals who had completed residency reported benefiting from only three of the nearly one hundred videos they watched. This suggests that the educational value of YouTube videos decreases as expertise increases. Therefore, YouTube is more useful for learners than for experts in a particular field.

One limitation of YouTube as an educational platform is that content creators from around the world can upload videos on any topic without any prerequisites or qualifications, which can lead to a decline in the quality of content. In general, there is often a negative correlation between the number of views a video receives and the quality of its content. For example, in one study, when "laparoscopic cholecystectomy" was entered into YouTube's search engine, an evaluation of the top videos revealed that many demonstrated suboptimal techniques, with more than half displaying unsafe maneuvers and only 10% deemed satisfactory.¹⁴ Another study reported that the most popular thyroidectomy video hosts on YouTube had no scientific publications on thyroid surgery. This finding highlights the lack of correlation between the popularity of a video and the academic expertise of the uploader.¹⁵ These studies emphasize the need for people searching for educational videos to carefully evaluate the source of the content and not rely on popularity or the number of views alone. Our findings also emphasize that for educational purposes, it is more important to check the credentials of the content creator than to consider the number of views.

A closer examination of our study reveals that in terms of educational quality and content reliability, a significant portion of videos on YouTube can be classified as "garbage." In our study, the average GQS was 2.5 ± 1.2 , and the Jama score was 2.1 ± 1.1 . This situation was much lower, especially in the nonmedical group (1.8 ± 1 and 1.6 ± 0.8 , respectively). This is especially true for videos uploaded by individuals without a medical background, which tend to have very low educational value. Helming et al. reported similar results in their systematic review. Thirty-one studies were examined, the average Jama score was 1.3, and the GQS score was 1.7. He emphasized that these scores decreased much more in nonacademic group posts.¹⁶ Studies have shown that only 36% of health-related videos on YouTube are uploaded

by reliable sources, such as official organizations or health professionals, whereas the remaining 63.7% come from unreliable sources with unverifiable affiliations.¹⁷ Conversely, videos produced by professional associations or government organizations are typically the most reliable.¹⁸ Many surgical journals also utilize social platforms such as YouTube and Twitter to promote education by providing content that combines information and infotainment. Scientifically reliable material is often shared on these platforms, e.g., surgical videos that support published articles and are created directly by the authors themselves. Additionally, many medical associations upload online seminars or webinars to their YouTube channels, thereby disseminating scientifically validated, peer-reviewed information to a global audience. Dr. Alhasan, who manages the YouTube channel for Surgery magazine, notes both advantages and disadvantages in using YouTube. The benefits of the platform include providing a reliable source of information, open and retrievable access and the 'humanization of literature' to make it accessible to a wider audience. However, there are still concerns about copyright and ethical issues.¹⁹

The rise of social media has also fuelled health-related debates. For example, during the COVID-19 pandemic, platforms such as Twitter, Instagram and YouTube played important roles in organizing resistance to vaccination. Similarly, discussions on these platforms led to the banning of plastic mesh in vaginal surgeries in several countries. Victims of mesh complications used these platforms in collaboration with support groups to organize and raise awareness, declaring May 1st as International Mesh Awareness Day.²⁰ These examples highlight the great impact of social media.

This study, which was conducted with individuals at three different points in their careers, is noteworthy in this respect. One of the most important limitations of this study is that it was conducted with a small number of people. However, since YouTube is a dynamic platform, these results are dependent only on the date and people on which it was carried out. Conducting similar studies on a larger sample size will yield more reliable results.

CONCLUSION

In the modern era, YouTube videos have become valuable supplementary tools in medical education, particularly in surgical training, where visual aids are crucial. However, individuals must exercise caution and critical thinking when engaging with these resources, opting for videos from reputable sources such as official medical associations or medical journals known for their educational quality. These institutions should also strive to leverage the YouTube platform more effectively to remain current and accessible to a global audience. The role of YouTube in medical education is increasing, but higher-quality content needs to be encouraged.

Ethics Committee Approval: Since the study was conducted with public data, no ethics committee decision was needed.

Informed Consent: Verbal consent was obtained from the people who evaluated the videos.

Peer-review: Externally peer-reviewed.

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Development of Clinical Reasoning and History-Taking Remediation Training

ABSTRACT

Objective: Clinical reasoning and history skills are essential for health care professionals. The design of "remediation" training to compensate for "learning gaps", which may occur for various reasons in educational programs, is recommended. This study aimed to develop remediation training within the scope of a model for clinical reasoning and history-taking skills.

Methods: This study was designed as program development research. In this study, the researchers followed Kern's six-step training approach. The objectives were determined in accordance with the general requirements. The application was developed via a flipped classroom. Pre- and posttests were performed for assessment. For satisfaction, the participants were asked to rate the training on 5 points.

Results: A total of 46 students volunteered to participate in this study (n = 46). The pretest mean score was 73.47±15.23, and the posttest mean score was 88.69±9.79. The pre- and posttest results were significantly different ($P < .05$). The mean preself-efficacy score was 5.87 ±1.71, and the mean score was 7.89 ±1.16. Pre- and postself-efficacy scores were statistically significant ($P < .05$). The mean satisfaction score of the participants was calculated as 4.57±0.58.

Conclusion: In this study, remediation training was developed for medical education programs. In accordance with the literature, remediation training has been shown to contribute similarly to learning. Educational programs should be enriched with more comprehensive studies to be developed in line with these findings.

Keywords: Medical education, Remediation training, Clinical reasoning skill, Taking history skill

INTRODUCTION

Clinical reasoning and history-taking skills are essential for healthcare professionals to understand and analyze patient problems.^{1,2} These skills go beyond theoretical knowledge and require nontechnical cognitive and social abilities.³ In numerous international studies, concepts such as clinical reasoning, skill development, mentoring, supervision, and assessment in healthcare education have contributed to our understanding of the significance of both technical and nontechnical skills in clinical practice.⁴⁻⁷ These concepts highlight the need for effective educational strategies aimed at enhancing these skills. Lluch et al. conducted a 3-year study on peer mentoring as a tool for developing soft skills in clinical practice. The study involved 276 students and revealed that nontechnical skill acquisition improved over three years of clinical training. This highlights the importance of incorporating mentoring programs to enhance student skills.⁴ Gregersen et al. explored students' perspectives on practical nursing skills. This study emphasizes the need to review the approach and content of practical nursing skill learning in undergraduate programs to better prepare students for clinical practice.⁵ Tseng discussed learning theories and principles in surgical education and technical learning. The article highlighted the importance of deliberate practice in cementing surgical skills and the need to target not only technical skills but also nontechnical and cognitive skills in surgical coaching frameworks.⁶ Johnson and Smith discussed how respiratory clinical guidelines can inform ward-based nurses of their clinical skills and knowledge of evidence-based care. This article identified the common core knowledge and technical and nontechnical skills required for the optimal care of adult patients.⁷

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Remediation training is a promising intervention for resolving the problem of noncompletion in higher education.⁸ The authors discussed the importance of remediation in medical education and its impact on failing learners, remediators, and health and educational systems.⁹ They also argued that accurately diagnosing underperformance and identifying its causes is crucial for effective remediation.¹⁰ This approach supports the learning-to-learn approach and contributes to closing learning gaps. The authors suggest that remediation can provide valuable insights into the generalizability of interventions and allow for more rigorous study designs to determine cause–effect relationships.¹⁰ During the challenging conditions of the pandemic, endeavors were undertaken to generate solutions that catered to students' needs. Recognizing the urgency of providing remediation education while students continue their clinical education, a two-day rapid training program was developed.

This study aims to develop a program within the scope of a model in the context of remediation training.

METHODS

This study was designed as program development research¹¹. This study received approval from the Ethical Committee/Board of Süleyman Demirel University (No: 53/12 Date: 10.11.2021). This study was conducted in accordance with the principles outlined in the Declaration of Helsinki. The invitation to participate in the study was extended to all 297 4th-year students (in the first year of the clinical phase) through a mobile platform, and 46 volunteer students participated (n = 46). Response rate %15.48 calculated. Written informed consent was obtained from all the participants.

The Faculty of Medicine at Süleyman Demirel University is a prominent institution in Turkey that focuses on education and research in the field of health. With strong academic staff in the medical field and modern educational infrastructure, the faculty stands out as a leading establishment dedicated to training the future generation of medical professionals. The faculty not only provides comprehensive medical education but also develops various programs and projects to contribute to clinical practice, research, and public health services. Through high-quality education and research in the healthcare sector at both the national and international levels, the Süleyman Demirel University Faculty of Medicine has made valuable contributions to healthcare. In the pregraduate education programme at Süleyman Demirel University, Faculty of Medicine, training was implemented in 2018 to enhance these skills. However, owing to the COVID-19 pandemic, these training sessions were transitioned to an online format, with lectures replacing small group training sessions. In the 2021-2022 academic year, the Süleyman Demirel University Department of Medical Education

and Informatics conducted a needs analysis study to identify the educational needs of clinical students after the pandemic. In the needs analysis study, the students were asked whether they required remedial training for the education they received during the pandemic period. For those who answered "yes" to this dichotomous question, a follow-up question was posed regarding the specific subjects in which they needed support. The responses indicated that students primarily required training in anamnesis, clinical reasoning, and causation. In response, the Department of Medical Education developed a focused training plan that covered all three topics. Feedback on the training was obtained from the student representative, and the implementation phase was initiated. The feedback received indicated a strong demand for "clinical reasoning and history skill training" among these students.

In this study, the researchers followed Kern's six-step approach to program development.^{12,13} Kern's six-step approach refers to a model used in the development of medical education programs¹⁴. This model offers a structured framework that encompasses the various stages of planning, designing, and implementing medical education initiatives. It has been frequently used in numerous academic studies^{15,16}. Kern's six-step approach consists of the following stages: identification of general needs, targeted need assessment, identification of learning objectives, educational strategies and implementation, and evaluation of participants and the program.¹³

Step 1: Identification of general needs: In the 2021-2022 academic year, the Department of Medical Education and Informatics conducted a needs analysis for compensatory education after the pandemic through all faculty members and students.

Step 2: Targeted need assessment: The feedback, taken from clinical-phase students, underlines the requirement for nontechnical skills, especially clinical reasoning and history-taking skills.

Step 3: Identify the learning objectives: The aim of the program was as follows: "Students will gather knowledge about the importance of taking history and the use of the Calgary–Cambridge guide to interview efficiently with patients and algorithms of clinical reasoning."^{17,18}

"Students will be able to interview patients comprehensively and efficiently to collect key clinical findings needed to reason about diagnostic hypotheses" and "students will gain self-efficacy in history taking and clinical reasoning skills."

Steps 4–5: Educational strategies and implementation: In the process of designing and implementing the educational strategy. First, a need analysis was conducted. After the needs were

determined via a mobile communication application (WhatsApp), a brief introduction of the program was shared with the 4th-year students. The students were asked to take part in this program if they had some difficulties while taking a history or critical thinking process or if they felt uncomfortable.

To determine the educational strategy, the flipped classroom approach in the LMS (Moodle) of our medical school, defined as an active learning method, was preferred. The learning sources include books about “propaedeutic education for clinical education,” some published manuscripts about patient–physician interviews, history taking and the scripts of some clinical scenarios and videos of appropriate and inappropriate samples of patient–physician interviews” before two weeks of educational activity.

The students were divided into small groups according to the order of registration, including five students (only one had six students).

A brief lecture was given by the first educator (also a researcher in the study), which included the importance and steps of the medical interview. Two videos were shown. After the video was presented, which included both appropriate and inappropriate samples of patient–physician interviews, the educator created a discussion environment for brainstorming.

The students also indicated on a flipchart the key aspects that enhanced the medical interviews. In the third session, a second educator (also a researcher in the study) gave a lecture about the clinical reasoning and scripts of different cases and the thinking pathway of senior physicians. After this session, a simulated patient acted on two clinical scenarios: cerebrovascular ischemia and ectopic pregnancy. The small groups included five students (only one group had six students) who were interviewed with a peer-simulated patient, and the students attempted to make a diagnosis. Educators monitored the process and provided feedback to each student.

Step 6: Evaluation of both the participants and the program: To assess the learning process for both clinical reasoning and history-taking skills, pre-and posttests were applied. The evaluation process was furthered in three ways: cognitive and self-efficacy measurement and feedback analysis. A 10-question exam consisting of equivalent questions was created for the assessment tools used in the program to determine cognitive changes. For both instruments, there were ten multiple-choice questions, and each question was given a score of more than 10 points. Three questions were created to determine changes in self-efficacy levels. To assess self-efficacy, three questions with a global rating scale (1-10) were created to manage patient–physician interview skills and clinical reasoning skills. The mean

of the three question scores was recorded as the self-efficacy level of the participants.

After the instruments were developed, for the equality of the pre/posttests and the validations of the instruments, expert opinions were received. The experts were academic staff working at the same institution, and all were specialized physicians. One of them was an expert in the academic development of cognitive or psychometric measurement tools. They were asked to voluntarily participate in the project.

Pretests and preself-efficacy tests were conducted before the training. After training, posttest and postself-efficacy tests were conducted.

The students’ feedback was also noted and analyzed for overall satisfaction with the program.

The first two steps of the Kirkpatrick model were evaluated during training.¹⁹ In the first step, participant satisfaction was evaluated. In the second step, the realization of learning was evaluated.

Statistical Analysis

The SPSS software program SPSS (V24) was used for the study. In this study, data analysis was performed with the significance level set at $P < .05$. Descriptive statistical analysis was performed to determine the means and standard deviations of the values. The distribution of the data was assessed via the Shapiro–Wilk test, and the impact of the educational intervention was evaluated via the paired sample t test.

RESULTS

In this study, we aimed to reach all 4th year students in the School of Medicine who need to receive remediation training for history taking and clinical reasoning training. Therefore, no sample was included in this study. All the students who responded to the announcement and wanted to participate in the training were included in the study. A total of 46 students volunteered to participate in the study ($n = 46$); 35 participants (76%) were female, and 11 (24%) were male. The mean age was 21.98 ± 1.32 years (min: 20 years, max: 26 years). Students from the four internship programs participated in this study (Table 1).

Table 1. Students participating in the study according to the internship program

The Internship Program		n	%
Internal internships	Pediatrics	16	34.78
	Internal Medicine	6	13.04
Surgical internships	Gynecology and Obstetrics (Gyn/Ob)	14	30.43
	General Surgery	10	21.74
	Total	46	100%

In this study, we compared the pre- and posttest scores of the 46 participants. The mean pretest score was 73.47, with a standard deviation of 15.23, whereas the mean posttest score increased to 88.69, with a standard deviation of 9.79. A paired-sample *t* test revealed that this difference was statistically

significant ($t(45) = 5.93, P < .001$). Furthermore, the effect size, as measured by Cohen's *d*, was 1.19, indicating a large effect size. These findings suggest that the intervention or educational program led to a significant and substantial improvement in participants' test performance (Table 2).

Table 2. Pre-test and post test scores of overall groups

Variable	N	Mean±SD	Min	Max	CL for Mean***		t-value	p-value*	Cohen's d
					Lower 95%	Upper 95%			
Pretest	46	73.47 ±15.23	30	100					
Post test	46	88.69 ± 9.79	70	100	10.10	20.33	5.93	$P < .001^{**}$	1,19

* $P < .05$ is significant level

**paired sample *t* test

*** 95% Confidence Interval of the Difference

Also we examined the pre- and postintervention self-efficacy scores of 46 participants. The mean preintervention self-efficacy score was 5.87 (SD = 1.71), with scores ranging from 1 to 9.33. After the intervention, the mean self-efficacy score increased to 7.89 (SD = 1.16), with scores between 5.67 and 10. A paired sample *t* test revealed a statistically significant increase in self-

efficacy scores from pre- to postintervention ($t(45) = 11.60, P < .001$). The 95% confidence intervals for the mean difference were 1.16 and 2.36. The effect size, measured via Cohen's *d*, was calculated to be 1.40, indicating a large effect size. Given that our study's effect size of 1.40 exceeds both sets of thresholds, it can be interpreted as representing a substantial and meaningful improvement in self-efficacy following the intervention (Table 3).

Table 3. The pre-self-efficacy and post self efficacy scores of overall groups

Variable	N	Mean±SD	Min	Max	CL for Mean***		t-value	p-value*	Cohen's d
					Lower 95%	Upper 95%			
Pre self- efficacy	46	5.87 ±1.71	1	9.33					
Post self efficacy	46	7.89 ±1.16	5.67	10	1.16	2.36	11.60	$P < .001^{**}$	1,40

* $P < .05$ is significant level

**paired sample *t* test

*** 95% Confidence Interval of the Difference

Participant satisfaction was assessed via the Kirkpatrick model. The mean satisfaction of the participants was calculated as 4.57 ± 0.58 (min: 3, max: 5).

DISCUSSION

Clinical reasoning is a critical skill for healthcare professionals, as it involves the ability to analyze patient data, make accurate diagnoses, and develop appropriate treatment plans.²⁰ Clinical reasoning involves analyzing patient data, generating hypotheses, and evaluating the likelihood of each diagnosis on the basis of available evidence.²⁰ This requires a combination of knowledge, experience, critical thinking, and problem-solving abilities. It also involves considering the patient's individual characteristics, such as medical history, risk factors, and preferences, to make informed decisions. Healthcare professionals use various strategies and tools to enhance their clinical reasoning skills. These may include utilizing clinical guidelines and protocols, seeking input from colleagues or

specialists, conducting further diagnostic tests or imaging studies, and continuously updating knowledge through ongoing education and professional development.

A comprehensive and accurate patient history is a fundamental skill in clinical practice, as it serves as the foundation for clinical reasoning and diagnostic decision-making.²¹ The process of history taking provides valuable information that can reveal a clinician's ability to initiate diagnostic reasoning, which is an essential component of clinical reasoning.²¹ Training in history taking is crucial for medical students, as it involves skills in communication, clinical reasoning, and summarization.²² These nontechnical skills are essential for high-level cognition and require effective training methods and optimal timing.²² Integrating history-taking training early in medical education can help students develop these skills and enhance their clinical reasoning abilities.²²

To develop "Clinical Reasoning and History Taking Skills" remediation, a combination training program was designed to

increase students' proficiency in effective history-taking and clinical reasoning. The program included a brief lecture on medical interview skills, an educational video of patient–physician interviews, a brief lecture on clinical reasoning, and peer-simulated patient action to emphasize Kern's six-step approach. This study aimed to assess the effects of this training on medical students' clinical skills at various stages of their education.

The literature emphasizes the need for rigorously designed assessments to identify specific deficits in clinical reasoning and history-taking skills.²³ It also highlights the multidimensional nature of clinical reasoning and the challenges in fostering the acquisition of these skills among medical learners.²⁴ In addition, the importance of using established standards as the basic framework for medical education accreditation is underscored.²⁵

Furthermore, the literature discusses the need to remediate knowledge deficits before developing clinical reasoning skills.²⁶ It also provides resources for faculty development to assist with diagnosing and remediating learners' clinical reasoning difficulties.²⁷ Moreover, it outlines the causes of errors in clinical reasoning and offers strategies to address them.²⁸ Additionally, it provides a detailed overview of clinical reasoning difficulties, including cues for clinical supervision and targeted remediation strategies.²⁹

The development of a taxonomy for clinical teachers further enhances the understanding of clinical reasoning difficulties and provides a useful tool for remediation.²⁹ The literature also reviews the detection and remediation of clinical reasoning difficulties, offering practical steps for accurately diagnosing and resolving these problems.²⁹ Moreover, the enhancement of clinical research capabilities for medical undergraduates through innovative simulation-based clinical research curriculum development has been discussed.³⁰ Although methods to improve clinical reasoning have been proposed, limited evidence is available to guide remediation practices.³¹ This scoping review emphasizes the need for remediation programs for regulated healthcare professionals and provides insights into the literature on this topic.³² Additionally, one study reported the use of a mobile application to help clinical teachers verify and describe clinical reasoning difficulties.³³ Educators expressed modest confidence in remediating deficiencies in clinical skills among medical students.³⁴ Preclerkship predictors of clerkship variance have been identified, and efforts have been made to tailor the remediation of clinical skills and reasoning for medical students before they enter the clerkship period.³⁵ Furthermore, targeted needs assessments were conducted to evaluate the efficacy of clinical leadership curricula for pediatric residents.³⁶

The gathered data indicate that "clinical reasoning and history-taking skills training effectively enhanced students' clinical reasoning abilities". The participants reported being better equipped to assess patients and manage the history-taking process more strategically following training. Furthermore, the posttraining self-assessment results reflected an increase in students' self-confidence. Our study revealed that there was a statistically significant difference for both skills in accordance with the literature.^{4,9,21}

In the program evaluation of the training, satisfaction was achieved in the first step, and learning took place in the second step. The "Clinical Reasoning and History Taking Skills" training has emerged as an effective remediation program for developing skills critical to clinical practice among students. This training program should be regarded as a significant step toward enhancing students' ability to engage in effective patient communication, history taking, and clinical reasoning, all of which are vital aspects of their medical practice.

This study presents the outcomes of enhanced remediation training focusing on "clinical reasoning and taking history skills." However, this study has certain limitations and constraints that should be acknowledged. These limitations underscore certain crucial aspects of the outcomes and general applicability of the study. The data collection process was executed within a restricted timeframe. This implies that a more extended data collection period could have facilitated greater diversity and depth of data. Owing to the brevity of the data collection period, certain subgroups might not have been adequately represented, which could influence the generalizability of the results. The methods and instruments employed in this study exhibit constraints. For example, the survey form employed for data collection might not comprehensively reflect the participants' emotional states and could omit certain essential details. Furthermore, the statistical analysis methods employed in this study are based on specific assumptions, potentially introducing a constraint concerning the alignment of these assumptions with the real-world context. This study was confined to a specific geographical region or sample group. This limitation implies that the applicability of the outcomes to other geographic regions or different sample groups may be limited. Notably, the results may diverge in distinct cultural and demographic contexts. The funding and resources allocated to this study were subject to certain limitations. A larger budget or additional resources could have facilitated a more comprehensive data collection process or the utilization of more sophisticated analytical methods. Despite these limitations, the outcomes of this study continue to serve as a foundation for valuable scholarly insights and contribute to future research endeavors. Nonetheless, being cognizant of

these limitations and constraints is pivotal for interpreting the study's results and enhancing their generalizability.

The COVID-19 pandemic has substantially impacted medical education, prompting a swift transition to online teaching methods for medical students.³⁷ As we navigate through this transitional phase, it is crucial to ensure that these recent shifts in medical education are thoughtfully integrated with the eventual reintroduction of face-to-face teaching.³⁷ Within this transitional period, various gaps have emerged in educational programs. Identifying these gaps through needs assessments and feedback mechanisms is imperative. We believe that when these identifications lead to the design of targeted small-scale educational interventions, students' foundational competencies can be enriched.

This study evaluated participant satisfaction and learning outcomes; however, the long-term effects of acquired skills were not examined. To assess the sustainability of educational interventions, it is essential to monitor participants' skill levels at multiple time point postintervention. Research indicates that early childhood social-emotional development lays the foundation for mental health and well-being. Specifically, social-emotional competencies, such as self-regulation, motivation, and interpersonal skills, play a significant role in academic and career success. Investigating how demographic factors, educational background, and initial skill levels affect the long-term effectiveness of educational programs is crucial. Studies have suggested that individual characteristics can significantly influence the outcomes of such interventions. The implementation of longitudinal studies with control groups can provide more definitive insights into the lasting impact of educational programs. These studies can help determine whether the observed benefits are sustained over time and are truly attributable to the intervention. In addition to cognitive skills, future research should assess the long-term effects of educational programs on social and emotional development. The early acquisition of social-emotional skills has been linked to improved life satisfaction, mental health, and physical well-being. For example, research has demonstrated that social-emotional learning programs can enhance students' academic performance and overall wellbeing. These recommendations aim to deepen our understanding of the sustained impacts of educational interventions and inform the development of programs that promote holistic development across a lifespan.

CONCLUSION

The evaluation of the effectiveness of two-day rapid training on clinical reasoning and history-taking skills is a crucial step in addressing the educational needs of clinical-phase students at Süleyman Demirel University, Faculty of Medicine. By employing

various assessment methods, valuable insights into the impact of training can be gained, which in turn will guide the refinement of the curriculum and ensure that students are equipped with essential skills to provide high-quality patient care.

Ethics Committee Approval: This study received approval from the Ethical Committee/Board of Süleyman Demirel University (No: 53/12 Date: 10.11.2021).

Informed Consent: Written informed consent was obtained from all participants.

Peer-review: Externally peer-reviewed.

Author Contributions: Author Contributions: Concept - GK, SU, MİBK; Design – SU, MİBK; Supervision - GK, SU; Resources - SU, MİBK; Materials - SU, MİBK; Data Collection and/or Processing - GK, SU; Analysis and/or Interpretation - GK, MİBK; Literature Review - GK, SU, MİBK; Writing - GK, SU, MİBK; Critical Review - GK, SU, MİBK

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Enhancing Clinical Clerkship Assessment: A Framework Aligned with the National Core Curriculum

ABSTRACT

Objective: To evaluate the effects of an innovative assessment framework for clinical clerkships aligned with the national core curriculum, aiming to enhance student-centered learning, interdisciplinary collaboration, and structured assessment practices.

Methods: This study employs a qualitative document analysis educational research design, focusing on the evaluation of an innovative assessment framework for clinical clerkships. A structured assessment framework was designed and implemented in all clinical clerkships at the Karadeniz Technical University, Faculty of Medicine. The framework integrated multiple assessment methods—structured oral exams, workplace-based assessments, and learner-centered activities—ensuring their alignment with curriculum objectives derived from the national core curriculum.

Results: The implementation of the framework resulted in a significant increase in the diversity of assessment methods between the 2020–2021 and 2023–2024 academic years. Previously, assessment relied heavily on multiple-choice exams. However, after implementation, structured oral exams, OSCEs, reflective writing, and workplace-based evaluations were widely incorporated. The integration of these methods improved the alignment of assessments with learning objectives and enhanced interdisciplinary collaboration in clinical education.

Conclusion: This study highlights the successful adoption of an assessment framework that aligns with the national core curriculum while promoting structured and competency-based evaluation. The findings support the literature on the benefits of structured assessment tools in medical education. The framework serves as a model for medical schools aiming to improve their accreditation readiness and enhance student-centered learning. Future research should explore the long-term impact of this model on student competency and adaptability in various institutional settings.

Keywords: Assessment, Framework, National core curriculum, Clinical clerkship, Accreditation.

INTRODUCTION

Assessment plays a pivotal role in shaping and refining medical curricula, serving as a key driver of educational quality and student competency development. In medical education, a well-structured, framework-based curriculum is essential not only for fostering comprehensive learning but also for ensuring alignment with accreditation standards and global best practices.¹ The integration of standardized curricular frameworks has been recognized as a fundamental approach to achieving consistency and coherence across medical education programs worldwide.² Studies emphasize that curriculum frameworks should not only outline core competencies but also incorporate structured assessment methodologies to measure learning outcomes effectively and drive continuous improvement in educational delivery.^{3,4}

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In many countries, including Türkiye, the National Core Curriculum (2020) has established fundamental educational standards to guide medical schools in designing programs that align with national healthcare priorities.⁵ This alignment ensures that future physicians develop the necessary competencies to meet societal health needs while maintaining international educational benchmarks.⁶ However, despite the presence of a national framework, individual medical schools must tailor their curricula to their specific institutional context, available resources, and infrastructural capacities.⁷ The adaptability of core curricula at the institutional level allows for innovations in teaching and assessment strategies, fostering interdisciplinary learning and competency-based education. Effective implementation requires ongoing evaluation to ensure that curricular adaptations meet accreditation criteria while maintaining the integrity of national and global medical education standards.⁸ Although national core curricula provide general guidance for medical education, there is limited evidence—both nationally and internationally—that explores how these frameworks are reflected in actual assessment and evaluation practices at the institutional level.

The structure of clinical clerkships at our faculty is designed to align with predetermined learning outcomes, allowing multiple disciplines to contribute to student training. Recognizing the critical importance of assessment in achieving these goals, the Department of Medical Education has developed an innovative assessment framework. This design not only promotes learner-centered educational approaches but also enhances the use of structured and objective assessment tools.

This study aims to evaluate the effects of an innovative assessment framework for clinical clerkships aligned with the national core curriculum, aiming to enhance student-centered learning, interdisciplinary collaboration, and structured assessment practices. The research questions were as follows:

1. How does the innovative assessment framework influence the diversification of learning approaches in clinical clerkships?
2. What is the impact of the assessment framework on the variety of assessment methods used in clinical clerkships?

METHODS

This study employs a qualitative document analysis educational research design, focusing on the effects of an innovative assessment framework for clinical clerkships. The framework was developed in alignment with national core curriculum standards to ensure competency-based assessment practices.

Document analysis, a systematic technique for reviewing and interpreting educational materials, provides a comprehensive understanding of the framework's structure and integration within the national core curriculum.⁹ By triangulating information from multiple institutional documents, this study enhances the validity of its conclusions regarding the implementation and impact of the assessment framework.

Data Sources

This study utilized publicly accessible curriculum documents from the Phase 4 and Phase 5 programs of the Karadeniz Technical University Faculty of Medicine as primary data sources. These documents provided detailed insights into the structure, content, and assessment strategies employed in clinical clerkships. Additionally, veri were extracted from the self-evaluation report prepared by the Karadeniz Technical University Faculty of Medicine as part of its accreditation process. This report offered a comprehensive overview of the institution's educational strategies, assessment methodologies, and alignment with national and international accreditation standards.

To ensure the reliability and relevance of the selected studies, the study applied specific inclusion and exclusion criteria. Documents were included if they:

- Were official and up-to-date, published within the last five years, and directly influenced the institution's educational policies,
- Had direct relevance to curriculum design and assessment, particularly those shaping the clinical clerkship framework,
- Were publicly accessible and verifiable, originating from institutional reports, official websites, or accreditation documentation.

By systematically analyzing these carefully selected data sources, this study ensures an evidence-based approach to evaluating the assessment framework and its integration into the medical curriculum. The use of institutional documentation allows for a structured examination of curricular design and assessment practices, contributing to the study's validity and relevance.

Description of Framework

To achieve horizontal and vertical integration in undergraduate medical education, clinical clerkships have been restructured to align learning objectives with contemporary medical education and accreditation standards. This restructuring follows the "Temporal Coordination" level, classified as the fifth level of integration, where courses are synchronized but taught separately.⁸

Our medical faculty's long-term vision (6–8 years) is to advance toward interdisciplinary and transdisciplinary integration. This goal requires a holistic approach to curriculum alignment, assessment systems, and program evaluation. The assessment framework for clinical clerkships was designed to:

- Ensuring that disciplines align their course content with the national core curriculum;
- Encourage multidisciplinary sessions and student-centered learning methods,
- Implement assessment strategies consistent with the educational approach,
- Foster interdisciplinary collaboration.

This assessment model has been successfully integrated into our faculty and continues to evolve as part of our commitment to enhancing medical education quality.

General Principles of Assessment Design: The following assessment principles align with our faculty's current level of integration and support its progression toward higher integration levels in the coming years¹⁰:

- All clinical clerkship topics must align with the theoretical course content outlined in UÇEP, including the Core Diseases/Clinical Problems (CD-CP) list, Basic Medical Practices (BMPs), and Behavioral, Social, and Humanities Sciences (BSHS) subcategories.
- The assessment level coefficients, developed by the KTU Department of Medical Education, are applied on the basis of UÇEP-2020 learning levels and recommendations. These coefficients determine the weight of each department's contribution to formative and summative assessments.
- The Clinical Clerkship calculates exam weightings both during (formative assessment) and at the end of the clerkship (summative assessment). If needed, they may consult the Department of Medical Education.
- The assessment designs proposed by Clerkships are reviewed by the Assessment and Evaluation Committee and implemented by the Faculty of Medicine Dean's Office.
- Assessment methods must align with educational activities. For example, departments using symptom-based learning (SBL) or similar approaches that support clinical reasoning and decision-making may conduct structured oral examinations (SOEs).
- The weighting coefficients are assigned as follows:

- SOE categories: 4× the weight of the theoretical course categories.
- BMP categories: 3× the weight of the theoretical course categories.
- SBL sessions: Evaluated via a form recommended by the Department of Medical Education. If not assessed, their weight is added to SOE.
- Student-centered learning activities: If a valid assessment tool is available, it contributes to the final grade. Otherwise, its 5% weight is added to SOE.
- Workplace-based assessments (360° evaluation, OSCE, Mini-CEX, DOPS, and professional attitude assessments): A coefficient of 6 was assigned. If unused, their weight is redistributed among other categories on the basis of the Clerkship Committee's decision.

The definitions and details of the assessment framework for clinical clerkships are presented in Table 1 and Figure 1. An example illustrating the implementation of the assessment framework is presented in Table 2.

Statistical Analysis

Following Bowen's⁹ qualitative document analysis approach, this study systematically examined relevant institutional documents to explore the integration and impact of the assessment framework. The analysis was conducted in a structured, multistep process to ensure methodological rigor and enhance data reliability.

The number of Theoretical Educational Activities	The number of CS/F/C educational activities		The number of BMP Trainings	The number of Applications for Professional Attitude and Skills in Clinical Settings	
49*1: 49	12*4: 48		4*3: 12	2*6: 12	
Theoretical exam	SOE ¹	BMP exam ²	Assessments for professional attitude and on-the-job clinical skills ³	Formative assessments of SBL ⁴	Formative assessments of learner-centered educational activities ⁵
49	48	12	12	~ %5	~ %5
~ 36.5%	~ 36.5%	~ 8.5%	~ 8.5%		

1. Each Structured Oral Examination (SOE) category is weighted **four times** that of theoretical course categories.

2. Each THU category is weighted **three times** that of theoretical course categories.

3. 360° Evaluation, OSCE, Mini-CEX, and DOPS are weighted at 6 for assessing professional attitudes and clinical skills. If unused, their weight is redistributed by the clerkship committee.

4. SBL sessions are assessed using a form recommended by the Department of Medical Education. If not evaluated by the clerkship committee, their **weight** is added to SOE.

5. If a suitable assessment tool is developed for learner-centered activities, it may affect the end of clerkship score. Otherwise, the **5% weight** is added to SOE.

Figure 1. Calculation of the proportional weight of the end of the clerkship score.

Table 1. Definitions and details of the assessment framework for clinical clerkships.

Definition		Description	Coefficient
Non-UÇEP educational activities		Educational activities that are not included in UÇEP or cannot be directly linked to a specific category.	1
Preliminary Diagnosis (ÖnT)		Educational activities that equip students with the ability to make a preliminary diagnosis in nonemergency situations and refer patients to specialists.	1
Preliminary Diagnosis + Prevention (ÖnT + K)		Educational activities that, in addition to preliminary diagnosis, cover preventive measures.	2
CD-CP ¹ with at least Level A		Educational activities that develop the ability to recognize emergency situations, provide initial treatment, and follow referral protocols.	2
CD-CP with at least Level T		Educational activities focused on diagnosing conditions, having knowledge about treatment, and referring patients to specialists.	3
CD-CP with at least Level TT		Educational activities that equip students with skills to diagnose, treat, and manage complications.	4
Theoretical Courses Related to BSHS Subtopics		Theoretical educational activities related to main and subtopics in Section 3 of UÇEP.	+1 ²
Learner-Centered Educational Activities		Student-centered educational methods include: small group work, case discussions, and reflection sessions, etc.	4 (+2 additional coefficient ³)
Basic Medical Practices	Level 1	Basic medical practices at the informational level.	1
	Level 2	Basic medical practices requiring application in emergency situations according to guidelines/protocols.	2
	Level 3	Basic medical practices that can be performed in common clinical conditions.	3
	Level 4	Basic medical practices that include interventions in complex cases.	3
Symptom-Based Learning (SBL) Sessions		Structured student-centered sessions that support clinical reasoning and decision-making processes.	5
Structured Oral Examination (SOE)		A structured oral examination system within clerkships that assesses clinical decision-making skills. The weighting is calculated based on the involvement of relevant departments.	Calculated based on the weighting of participating departments.
Workplace-Based Assessment (WBA) methods		Refers to the systematic evaluation of learners' clinical competencies, professional behaviors, and decision-making skills in real clinical settings. Common WBA methods include Mini-CEX, DOPS, and 360-degree evaluations, etc.	6

1- CD-CP = Core Diseases/Clinical Problems

2- If an educational activity integrates a BSHS topic, its coefficient increases by '+1'.

3- If a learner-centered educational activity is conducted with the participation of multiple departments, the organizing department receives an additional '+2' coefficient.

Table 2. An example implementation of an assessment design specific to the sensory internship block.

	Coefficient	Dermatology	Ophthalmology	ENT	PRS
Theoretical Educational Activities					
Non-UCEP-2020 Courses + Preliminary Diagnosis (ÖnT)	1	8*1: 8	12*1: 12	5*1: 5	1*1: 1
Preliminary Diagnosis + Other Levels (ÖnT and/or K)	2	1*2: 2	-	4*2: 8	1*2: 2
CD-CP¹ with at least Level A	2	-	-	2*2:4	2*2: 4
CD-CP with at least Level T	3	2*3: 6	-	1*3: 3	1*3: 3
CD-CP with at least Level TT	4	6*4: 34	1*4: 4	5*4: 20	1*4: 4
Theoretical Courses Related to BSHS Subtopics*	1	-	-	-	-
Learner-Centered Educational Activities	4	-	-	-	-
Total Score		40	16	40	14
Percentage		40%	16%	40%	14%
The Numer of Question per Departments in Theoretical exam		40	15	40	14
Clinical Symptoms/Findings/Conditions (CS/F/C)					
Dermatology	<ul style="list-style-type: none"> • Skin rashes/lesions (maculopapular, bullous, vesicular) • Changes in skin and appendages (dryness, discoloration, etc.) • Itching • Petechiae, purpura, ecchymosis • Oral apht 				5 ~ 41.5%
Ophthalmology	<ul style="list-style-type: none"> • Red eye • Vision impairment/loss 				2 ~ 17%
ENT	<ul style="list-style-type: none"> • Hearing impairment/Tinnitus • Ear pain/discharge/blockage • Hoarseness • Neck mass • Lenfadenopathy 				5 ~ 41.5%
Basic Medical Practices					
Non-UCEP-2020 Recommended Skills or Level 1		-	-	-	-
Level 2		-	-	-	-
Level 3		-	-	-	-
Level 4		1*4: 4	1*4: 4	1*4: 4	1*4: 4
Total		4	4	4	4
Percentage		25%	25%	25%	25%

Initially, publicly accessible faculty-related documents were identified and collected on the basis of their direct relevance to the study's aim. These documents were then meticulously reviewed, with a particular focus on their authenticity, contextual significance, and alignment with the Karadeniz Technical University Faculty of Medicine assessment framework. To increase the validity of the findings, a structured thematic framework was defined on the basis of the assessment framework. After the themes were defined, the analysis involved an iterative coding process in which key categories were identified through an inductive approach. Thematic coding was performed manually by the researcher, ensuring consistency and depth in the interpretation of the data. The coding framework was developed on the basis of recurring concepts, curriculum alignment indicators, and assessment principles extracted from

the documents. Any emerging themes were continuously revised throughout the analysis process.

To strengthen the trustworthiness of the findings, the study employed methodological transparency by maintaining an audit trail of the analysis process. This included documentation of coding decisions, theme development, and cross-referencing of findings with the study objectives. Finally, the findings were systematically interpreted in relation to the research question, with document analysis providing robust evidence supporting the conclusions of the study.

RESULTS

This assessment design framework has been implemented in all clerkships in Phase 4 and Phase 5 at the Karadeniz Technical University Faculty of Medicine since the 2021–2022 academic year.

The document analysis process identified two main themes: educational activities and assessment activities, each comprising several subthemes. Educational activities include learner-

centered classroom activities, multidisciplinary educational approaches, experiential learning methods, laboratory-based training, and structured workplace-based educational activities. Assessment activities are categorized into theoretical exams, performance-based assessments, and comprehensive evaluations, reflecting different levels of competency assessment. A detailed breakdown of these themes, including categories and coding, is presented in Table 3.

Table 3. The revealed themes, categories and coding after the document analysis process.

Themes	Subthemes	Categories	Coding
Educational Activities	Learner-centered classroom activities	Symptom-based learning activities	<ul style="list-style-type: none"> Task-based educational activities Symptom-based learning
		Multidisciplinary educational activities	<ul style="list-style-type: none"> Panel Entegredated session
	Experiential learning activities	Laboratory-based trainings	<ul style="list-style-type: none"> Clinical skills trainings
		Structured workplace- based educational activities	<ul style="list-style-type: none"> Educational activities in wards Education activities in clinic
Assessment Activities	Theoretical exams	Knows	<ul style="list-style-type: none"> Multiple Choice Exam Reflective Writing Assignment
		Knows how	<ul style="list-style-type: none"> Structured Oral Exam Scientific Research Practices
	Performance-based assessment	Shows	<ul style="list-style-type: none"> Objective Structured Clinical Exam (OSCE) Simulation Methods and Evaluation
		Does	<ul style="list-style-type: none"> Workplace-based assessment in clinics Patient File Preparation
		Comprehensive evaluation	<ul style="list-style-type: none"> Clerkship Logbook

The distribution of learner-centered educational activities over the past four years is presented in Table 4. Prior to the implementation of this assessment design, from 2020--2021, the diversity of assessment methods was quite limited. However, by

the 2023--2024 academic year, this diversity had expanded significantly, encompassing various methods such as structured oral examinations, OSCEs, and reflective writing assignments (Table 5).

Table 4. The implemented learner-centered educational activities.

Academic Year	Learner-centered educational activities ¹	Year 4	Year 5	Total
2020 – 2021 ²	SBL (Online ³)	4	-	4
	Multidisciplinary educational activities	-	-	-
2021 - 2022	SBL	20	24	44
	Multidisciplinary educational activities	7	1	8
2022-2023	SBL	30	18	48
	Multidisciplinary educational activities	7	3	10
2023-2024	SBL	35	18	53
	Multidisciplinary educational activities	10	3	13

1- This includes interactive educational activities where learners take responsibility within a team, with allocated time.

2- The assessment design reflects the year before implementation in all clinical clerkships.

3- During the pandemic, symptom-based learning (SBL) was conducted via a learning management system-integrated Zoom application.

Table 5. Comparison of the implementation of assessment methods across eight clerkships in Phase 4 and Phase 5 between the academic years 2020--2021 and 2023--2024.

Structured Assessment Medhods	Number of Clinical Clerkship	
	2020-2021	2023-2024
Multiple Choice Exam	8	8
Structured Oral Exam	1	8
Objective Structured Clinical Exam (OSCE)	2	4
Patient File Preparation	2	6
Clerkship Logbook	-	2
Reflective Writing Assignment	-	1
Simulation Methods and Evaluation	-	2
Workplace-Based Assessment in Clinics	-	1
Scientific Research Practices	-	1

DISCUSSION

This study highlights the successful implementation of an assessment framework at the Karadeniz Technical University Faculty of Medicine since the 2021–2022 academic year. The framework effectively integrates learner-centered approaches and structured evaluation methods, leading to a significant increase in the diversity of assessment tools. These findings demonstrate the positive impact of the framework on the development of undergraduate medical education.

The results align with the literature, which suggests that structured assessment tools, such as OSCEs and structured oral exams, enhance the quality of education and ensure better alignment with curriculum objectives.¹¹⁻¹³ By integrating such methods, this framework not only supports student learning but also contributes to the ongoing improvement of medical education quality.^{14,15}

Furthermore, similar structured assessment frameworks have been implemented in international medical education systems. For example, the OSCE is widely adopted in the global context as a standardized method for assessing clinical competencies in medical education.¹⁶⁻¹⁸ Likewise, medical schools have integrated structured oral exams to enhance student evaluation, demonstrating a parallel trend toward a competency-based assessment model.¹⁹ Comparing these approaches to our framework underscores its alignment with global best practices, suggesting its potential scalability and adaptability in various international educational settings.

One of the key strengths of this framework is its innovative approach, which serves as a model for other medical schools in Türkiye. It fosters interdisciplinary collaboration, aligns learning objectives with the national core curriculum, and promotes the use of diverse and structured assessment tools. Additionally, the

framework incentivizes departments to adopt learner-centered methods, thereby advancing the overall educational experience. While its implementation at the Karadeniz Technical University Faculty of Medicine has been successful, its adoption in other medical faculties may require institutional support, faculty training, and a phased implementation strategy to ensure sustainability.^{20,21}

This assessment framework has practical implications for medical schools seeking to align their curricula with national core curriculum standards and improve their accreditation readiness. It provides a structured approach to designing assessments that are fair, diverse, and aligned with educational activities. Although this assessment framework was developed within the context of the national core curriculum, the emerging themes and categories align with modern international medical education literature.²²⁻²⁴ Therefore, this framework has the potential to be utilized not only at the national level but also in international contexts. The incorporation of student feedback into the design and implementation process can further enhance its effectiveness.

Despite its promising contributions, the assessment framework is not without limitations. Its successful implementation at the Karadeniz Technical University Faculty of Medicine benefited from strong institutional support and motivated faculty members, who may not be readily available in other medical schools. Broader implementation could face challenges such as limited resources, varying levels of faculty engagement, and the need for continuous professional development. The framework, while aligned with national standards, may also require further refinement to ensure flexibility and applicability across different departments and medical education contexts. Incorporating more systematic student feedback and evaluating long-term outcomes will be

essential for improving its effectiveness and sustainability. Finally, this study did not include individual-level student performance or long-term learning outcome data. Therefore, while changes in assessment diversity were observed, their direct impact on student achievement could not be measured and remains a subject for future investigation.

Future research should also focus on evaluating the framework's long-term impact on learning outcomes and testing its adaptability to other medical schools in Türkiye and beyond. Expanding the scope of implementation to include larger and more diverse samples would provide valuable insights into its effectiveness and scalability in various educational contexts.

CONCLUSION

The assessment and evaluation design for clerkships at the Karadeniz Technical University Faculty of Medicine presents an innovative and structured approach aligned with national core curriculum standards. This framework supports the implementation of learner-centered educational activities and the use of structured assessment tools that align with instructional goals.

Medical faculties seeking to adopt a similar framework should ensure alignment with their own curricular structures and institutional priorities. The key steps include establishing a curriculum-assessment alignment committee, involving faculty development programs to ensure a shared understanding of assessment principles, and gradually introducing structured assessment tools across departments. Institutions should also anticipate potential challenges, such as limited faculty readiness, resource constraints, and the need for continuous monitoring and feedback mechanisms to sustain implementation.

Ethics Committee Approval: This study was conducted using publicly available and accessible data obtained from institution's website. Since no personal, sensitive, or identifiable information was collected, and no interaction with human subjects took place, ethical approval was not required.

Informed Consent: This study was conducted using publicly available and accessible data obtained from institution's website. Since no personal, sensitive, or identifiable information was collected, and no interaction with human subjects took place, informed consent was not required.

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Although developed within the context of the national core curriculum, the emerging themes and categories of this framework resonate with international medical education standards. Therefore, the model has potential for adaptation in other educational contexts, both nationally and globally.

Kars is renowned for its harsh winter conditions, with temperatures occasionally plummeting to -20°C at the start of morning classes. This can be especially challenging for students from warmer or temperate climates. Moreover, extreme cold often makes it difficult for faculty members to start their vehicles and reach class on time. To alleviate these challenges, adjusting class start times to relatively warm hours of the day could be a viable solution. Furthermore, schools should pay attention to students' lives outside the classroom, such as housing and transportation issues, to increase class attendance.

In-person education is essential for skill training. However, it has begun to be seen as a burdensome method for conveying theoretical knowledge. Compared with remote online education, school education requires more effort, imposes a greater financial burden, and takes up more of the students' time. Today, the sources of accessing information have diversified and become more accessible. However, the school is not only a place where information is transmitted but also a space where socialization occurs. Therefore, attending school should remain a fundamental principle. However, schools need to reorganize their educational approaches in a way that highlights the advantages of both in-person and online education. It seems that hybrid education, which the pandemic forced upon us, will also retain its validity in the postpandemic period.

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Assessment of COVID-19-Positive Patients with ST-Segment Elevation Myocardial Infarction During the COVID-19 Pandemic

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ABSTRACT

Objective: The global impact of the coronavirus disease 2019 (COVID-19) pandemic has been shown to adversely affect the cardiovascular system. Investigating the clinical course of patients with ST-segment elevation myocardial infarction (STEMI) associated with COVID-19 infection is crucial to elucidate the mechanisms linking COVID-19 and STEMI. Assessing these patients from both cardiovascular and infection control perspectives is essential for improving clinical outcomes and reducing the burden on healthcare systems. This study aims to provide a comprehensive evaluation of the clinical course of COVID-19-positive STEMI patients.

Methods: This single-center, cross-sectional study analyzed 80 STEMI patients who underwent coronary angiography, comprising 38 COVID-19-positive individuals and 42 COVID-19-negative individuals. We assessed admission times, biochemical parameters, door-to-balloon times, angiographic data, length of hospital stay, and in-hospital mortality.

Results: The mean age in the COVID-19-positive group was 56.6±10.8 years, whereas that in the COVID-19-negative group was 53.6±10.8 years ($P = .238$). No significant differences in demographic characteristics were observed between the groups. However, C-reactive protein (CRP), white blood cell (WBC), and baseline troponin levels were significantly greater in the COVID-19-positive group ($P < .001$, $P = .005$, and $P = .037$, respectively). Echocardiographic evaluation revealed a lower ejection fraction (EF) in COVID-19-positive patients than in COVID-19-negative patients ($P = .023$). Angiographic evaluation revealed a greater thrombus burden and longer pain-to-balloon time in the COVID-19-positive group ($P = .001$ and $P < .001$, respectively). The length of hospital stay was also longer in the COVID-19-positive group ($P < .001$).

Conclusion: The findings of increased thrombus burden, prolonged pain-to-balloon time, and extended hospital stays among COVID-19-positive patients underscore the adverse cardiovascular effects of COVID-19. Delayed hospital presentation of patients with cardiovascular symptoms during the pandemic poses a challenge for timely diagnosis and management of critical cardiovascular conditions.

Keywords: COVID-19, STEMI, myocardial infarction, pandemic

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INTRODUCTION

The COVID-19 pandemic has placed immense pressure on global healthcare systems, reshaping clinical practice and leading to the near-collapse of healthcare infrastructures in many countries.¹ As the pandemic has progressed, the cardiovascular implications of COVID-19 have become particularly noteworthy. In particular, ST-segment elevation in COVID-19-positive patients has been associated with severe cardiovascular events such as acute myocardial infarction.² This clinical phenomenon has prompted healthcare professionals and researchers to seek a deeper understanding of the pathophysiological effects of COVID-19 on the cardiovascular system and to develop appropriate clinical approaches.³ However, the precise clinical characteristics, pathophysiology, and management of myocardial infarction associated with ST-segment elevation in COVID-19-positive patients remain unclear.⁴ By exploring the clinical characteristics and outcomes of COVID-19-positive STEMI patients, this study seeks to provide insights that may inform future approaches to cardiovascular care and infection control. The findings aim to support ongoing efforts to improve the management of this particularly vulnerable patient population. This study aims to comprehensively evaluate the clinical features, diagnostic methods, treatment options, and outcomes of myocardial infarction in COVID-19-positive patients presenting with ST-segment elevation.

METHODS

This cross-sectional study included all consecutive STEMI patients who presented to Recep Tayyip Erdoğan University Training and Research Hospital and underwent coronary angiography between May 1, 2020, and August 31, 2020. COVID-19 tests were conducted on patients in the emergency department, but they were admitted to the angiography unit without waiting for the results. Once the test results were available, patients were divided into two groups: positive and negative for COVID-19. Patients who presented with STEMI but did not undergo coronary angiography were excluded from the study. The following variables were assessed: the time of admission, initial troponin I level, number of door-to-wire visits, angiographic findings, length of hospital stay, and in-hospital mortality. Ethical approval was obtained from the local authority, and the study was approved by the Recep Tayyip Erdoğan University Non-Interventional Clinical Research Ethics Committee (Date: January 7, 2021 Number: 2021/E-40465587-050.01.04-9).

On the basis of the Fourth Universal Definition of Myocardial Infarction, patients with ST-segment elevation in two or more consecutive leads on electrocardiogram accompanied by chest pain were considered to have STEMI.⁵ Patients who experienced

cardiac arrest at the time of admission were excluded from the study. Additionally, patients treated more than 12 hours after the onset of chest pain were not included. The treatment protocol followed the ESC-STEMI guidelines. Primary percutaneous coronary intervention (PCI) was performed in all patients. After primary PCI, angiographic images were reviewed, and thrombolysis in myocardial infarction (TIMI) flow scores and angiographic modified thrombus grades were assessed, ranging from Grade 0 (no thrombus present) to Grade 5 (complete occlusion of the vessel by thrombus).⁶

All patients' COVID-19 diagnoses were confirmed by PCR and thoracic CT. COVID-19-positive patients were treated according to the guidelines of the Turkish Ministry of Health. Deaths related to COVID-19, including those caused by acute respiratory distress syndrome, septic shock, and respiratory failure, were recorded separately.⁷

Statistical Analysis

Statistical analyses were performed via SPSS version 22.0 (IBM SPSS Corp., Armonk, NY, USA). Continuous variables are expressed as the means \pm standard deviations or as minimum and maximum values, whereas categorical variables are presented as percentages. The distribution of continuous variables was assessed via the Kolmogorov–Smirnov test. Continuous variables were compared via Student's *t* test or the Mann–Whitney *U* test, as appropriate. Categorical variables were compared via the chi-square test. A *p* value of $<.05$ was considered statistically significant.

RESULTS

A total of 80 STEMI patients who met the inclusion criteria were enrolled in the study, comprising 38 COVID-19-positive patients and 42 COVID-19-negative patients. The mean age in the COVID-19-positive group was 56.6 ± 10.8 years, whereas the mean age in the COVID-19-negative group was 53.6 ± 10.8 years ($P = .238$). There was no significant difference between the two groups in terms of demographic characteristics such as sex, diabetes status, or family history (Table 1). When laboratory data were compared between the groups, the CRP, WBC, and baseline troponin levels were significantly greater in the COVID-19-positive group [$1.11 (.80-2.8)$ vs. $.80 (.60-2.5)$, $P < .001$; 11.2 ± 3.6 vs. 9.2 ± 2.6 , $P = .005$; $865 (100-7000)$ vs. $625 (160-3000)$, $P = .037$]. No statistically significant differences were observed in the other laboratory parameters.

According to the echocardiographic assessment, the ejection fraction (EF) of COVID-19-positive patients was significantly lower than that of COVID-19-negative patients (49 ± 9 vs. 54 ± 7.9 , $P = .023$). In the angiographic evaluation of the patients, the

thrombus burden and pain-to-wire time were significantly greater in the COVID-19-positive group than in the COVID-19-

negative group [55 vs. 19, $P = .001$; 294 ± 206 vs. 131 ± 142 , $P < .001$].

Table 1. Baseline Clinical and Laboratory Characteristics According to COVID-19 Diagnosis

Variable Description	COVID Positive (n= 38)	COVID Negative (n= 42)	P
Age Years	56.6 \pm 10.8	53.6 \pm 10.8	.238
Gender	59.5	55.3	.437
Diabetes %	19	18.4	.586
Hypertension %	19	21	.521
Smoking Status	38	29	.480
Dyslipidemia %	41.8	42	.560
Family History of CAD	15.8	16.7	.884
SBP, mmHg	132 \pm 17	133 \pm 24	.943
CRP mg/dL	1.11 (0.80-2.8)	.80 (.60-2.5)	<.01
Hemoglobin g/dL	12.8 \pm 1.3	12.5 \pm 1.3	.345
WBC Count $\times 10^3/\mu\text{L}$	11.2 \pm 3.6	9.2 \pm 2.6	.005
Baseline Troponin I Ng/L	865 (100-7000)	625 (160-3000)	.037
LDL Cholesterol	150 \pm 15	146 \pm 14	.176
HDL Cholesterol mg/dL	30 \pm 13	30 \pm 10	.935
Triglycerides mg/dL	205 \pm 71	192 \pm 69	.702
GFR	60.8 \pm 18	63 \pm 17	.460
BMI	23 (16-31)	24 (16.9-36)	.206
EF %	49 \pm 9.4	54 \pm 7.9	.023
Thrombus Burden / High %	55	19	.001
Pain to Wire Time Minutes	294 \pm 206	131 \pm 142	<.001

Abbreviations: SBP: Systolic Blood Pressure, CRP: C-reactive protein; EF: ejection fraction; LDL: low-density lipoprotein; HDL: high-density lipoprotein; GFR: glomerular filtration rate; BMI: body mass index. The normal threshold value for troponin in our laboratory is <100 Ng/L.

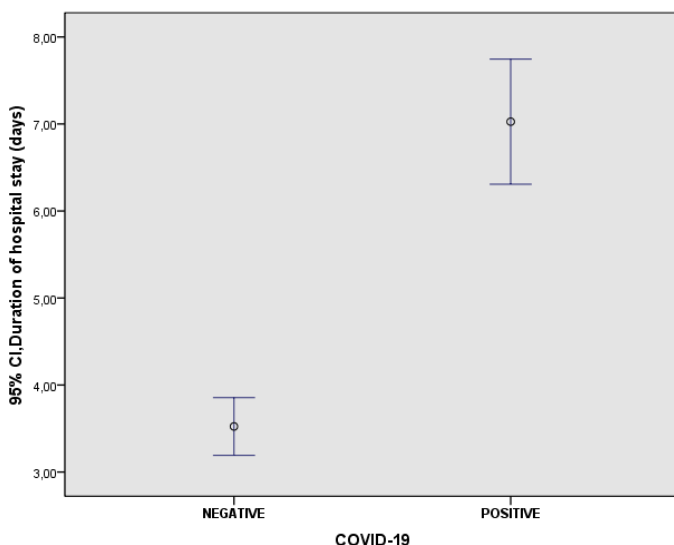


Figure 1. The length of hospital stay among participants

In terms of the length of hospital stay, COVID-19-positive patients had significantly longer hospital stays than did COVID-19-negative patients (7.02 ± 2.1 vs. 3.5 ± 1 , $P < .001$) (Figure 1). In the angiographic evaluation, three COVID-19-positive patients were

found to have less than 50% stenosis in the coronary arteries, whereas all COVID-19-negative patients had a responsible lesion causing significant stenosis in the coronary arteries. Furthermore, 16.7% of the COVID-19-positive patients were identified as having multivessel disease, whereas 18.4% of the COVID-19-negative patients were identified, with no significant difference between the groups ($P = .837$). In the COVID-19 group, one patient died in the hospital due to cardiovascular collapse, whereas there were no in-hospital deaths in the negative group.

DISCUSSION

In this study, the demographic characteristics, laboratory findings, and echocardiographic and angiographic assessments of STEMI patients in the COVID-19-positive and -negative groups were examined. While there were no statistically significant differences in demographic characteristics between the COVID-19-positive and -negative groups, elevated biochemical parameters indicating inflammation, a lower ejection fraction, a greater thrombus burden, and increased hospital stays were observed in COVID-19-positive patients. These findings may suggest that the risk factors associated with COVID-19 independently contribute to the occurrence of STEMI.

According to the literature, the excessive and uncontrolled release of cytokine signaling molecules, which are crucial in the immune system's response to infection, can lead to a condition known as a "cytokine storm".⁸ COVID-19, characterized as a virus that triggers inflammatory responses, is particularly associated with increased cytokine release.^{9,10} In line with the literature, our laboratory findings revealed that CRP, WBC, and baseline troponin levels were significantly higher in the COVID-19-positive group. These findings support the notion that COVID-19 infection may adversely affect the cardiovascular system by enhancing the inflammatory response.^{11,12} In COVID-19 patients, there has been an increase in endothelial damage and the risk of thrombosis in the vascular wall. Platelets, depending on their mean platelet volume and function, can mediate clotting and inflammation, potentially reducing plaque stability and increasing the tendency for atherosclerotic plaques to rupture. This condition may increase the risk of acute coronary syndrome.¹³ Furthermore, studies suggest that the inflammatory response may have direct toxic effects on the myocardium and could lead to myocyte damage.¹⁴ This situation suggests that COVID-19 may increase the risk of cardiovascular complications such as heart failure, arrhythmias, and myocarditis.

In a study examining the echocardiographic results of 447 COVID-19 patients, a decrease in ejection fraction (EF) values and impaired wall motion were observed. When angiographic findings were evaluated, multivessel disease was reported in these patients.¹⁵ Similarly, in our study, echocardiographic assessments revealed that EF in COVID-19-positive patients was significantly lower than that in COVID-19-negative patients. These findings support the notion that COVID-19 may directly affect the myocardium and adversely impact cardiac function.

The widespread distribution of angiotensin-converting enzyme II receptors in the myocardium facilitates the entry of COVID-19 into myocardial cells.¹⁶ In this context, the myocardium may become a direct target for the virus, leading to inflammation and pathological changes in cardiac tissue. Myocardial damage and immune response mechanisms can trigger the development of myocarditis. As a result of myocarditis, a decrease in myocyte contractility and electrolyte imbalances can lead to severe cardiovascular complications such as heart failure, arrhythmias, and valvular heart disease.¹⁷ This situation supports the idea that COVID-19 may cause transient or permanent functional impairments in the myocardium.

Observations indicate that during the pandemic, there has been an increase in STEMI presentations, with patients presenting later and having shorter hospital stays.¹⁸ Angiographic evaluations revealed that the thrombus burden and pain-to-wire time were significantly greater in COVID-19-positive patients than in COVID-19-negative patients, and the length of hospital

stay was significantly greater. While ST elevation is a rare and dramatic complication of coronary stenting, it necessitates urgent revascularization to prevent long-term cardiac dysfunction. It has been suggested that increased platelet aggregation in infected patients may lead to a greater risk of ST elevation.¹⁹ Therefore, COVID-19 may increase the risk of complications in STEMI patients and prolong the treatment process.

Thromboembolic events are increasingly recognized as a complication associated with COVID-19.^{15,20} Although increased thrombotic risk is linked primarily to systemic inflammation and endothelial damage, studies suggest that it may also stem from the effects of COVID-19 on coagulation mechanisms. Fizzah A. et al. presented strong evidence of increased thrombus burden, prolonged hospital stays, and poorer prognosis in patients with STEMI and concomitant COVID-19 infection.²¹ Similarly, we observed that the thrombus burden and pain-to-wire time significantly increased in COVID-19-positive patients, along with extended hospital stays. In our study, we emphasize the necessity for careful monitoring of potential cardiovascular complications by addressing the increased risk of thromboembolic events associated with COVID-19. A study examining 214 patients with acute coronary syndrome (ACS) revealed that the COVID-19 pandemic is not an independent primary risk factor for the development of ACS, with the leading risk factors being hypertension and elevated LDL levels. This finding also indicates that smoking and the increased stress associated with living alone have a more pronounced effect on ACS.²² However, in contrast to this viewpoint, some studies suggest that COVID-19 symptoms may complicate the identification of critical cardiovascular symptoms in patients, leading those experiencing ACS to confuse classic symptoms such as chest pain or shortness of breath with COVID-19 symptoms.²³ This situation may result in delayed hospital presentations for COVID-19 patients with ACS, consequently delaying the diagnosis and treatment of critical cardiovascular events.¹

Delayed intervention can prolong the duration of pain and increase the risk of permanent myocardial damage, heart failure, and even death. In our study, we associated the increase in pain-to-wire time with prolonged time to emergency medical intervention in COVID-19-positive patients. Similarly, in a study conducted by Aktaş et al., the door-to-balloon time was longer in COVID-19 patients, and those with COVID-19 symptoms, particularly when preoccupied with signs such as shortness of breath, may not receive timely diagnosis and treatment for critical conditions such as myocardial infarction.¹⁸ Therefore, we emphasize the critical importance of patients with COVID-19 symptoms recognizing cardiovascular emergency signs such as ACS and seeking timely medical assistance.

Limitations of the Study

The primary limitation of our study is the limited number of cases due to its single-center design. Additionally, only patients with ST-segment elevation myocardial infarction who underwent coronary angiography (CAG) were included in our study. Other acute coronary syndrome patients were not included, which prevents generalization to all acute coronary syndrome patients. The status of patients who did not undergo CAG, who presented with cardiopulmonary arrest, who received thrombolytic treatment, and who were followed up with medical therapy remains uncertain.

CONCLUSION

During the COVID-19 pandemic, the delayed presentation of patients with acute coronary syndrome (ACS) poses a significant issue that may hinder timely diagnosis and treatment of critical cardiovascular conditions. It is crucial for patients to consider cardiovascular symptoms alongside COVID-19 symptoms and take the necessary steps to seek emergency medical assistance. The increased thrombus burden, prolonged pain-to-wire time,

and extended hospital stays in COVID-19-positive patients reflect the adverse effects of infection on the cardiovascular system. These findings are important for understanding the cardiovascular complications of COVID-19 and managing patients appropriately. However, these findings need to be validated through further research, and advanced studies are needed to better understand the mechanisms of the relationship between COVID-19 and STEMI.

Ethics Committee Approval: Recep Tayyip Erdoğan University Noninterventional Clinical Research Ethics Committee approved the study with decision number 2021/08 on January 7, 2021.

Informed Consent: Written informed consent was obtained from all participants.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – HD, HD; Design – HD, HD; Supervision – HD; Materials – HD, HD; Data Collection and/or Processing – HD; Analysis – HD; Literature Review – HD; Writing – HD, HD; Critical Review – HD, HD.

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Media Literacy and Internet Usage in Baby Care: Generation Y Mothers

ABSTRACT

Objective: This study was conducted to determine media literacy and internet usage related to health and baby care issues.

Methods: This was a cross-sectional descriptive study. It was conducted on 175 Generation Y mothers (born between 1981 and 1995). The data were collected via the Media Literacy Level Determination Scale in five Facebook groups via online questionnaires. Mann–Whitney U and Kruskal–Wallis tests were used for data analysis.

Results: The mean age of the mothers was 30 years. Mothers used social media sites (30.3%) on the internet the most. More than half of the mothers preferred health institutions (33.8%) or scientific websites (32.5%) for obtaining information. Mothers frequently investigated issues related to disease (12.6%) and infant–child nutrition (10.9%). The mean score of the scale was 65.7 ± 11.6 . Media literacy, education level and internet usage year were not statistically significant ($P > .05$).

Conclusion: The media literacy level of the mothers was medium. Media literacy levels are higher among mothers who have graduated from university and have used the internet for more than five years. Nurses should consider that generation Y mothers can easily access information via social media.

Keywords: Generation Y, Media literacy, Health information, New media, Social media

INTRODUCTION

Social communication is changing, especially with new media, the internet, social media networks, and blogs. People closely follow health information in new media.^{1,2} People not only read health information via social media but also participate in the health communication process by writing and sharing health-related ideas and practices. This situation led to an extensive deal of health communication in health for all by the year 2000. The use of media has increased and has become an indispensable part of life.^{1,3-5}

The media usage rate varies according to certain age groups and generations.² The generations were named X, Y and Z because of changes in technology after the second World War. Generation X (1965-1980) meets technology; generation Y (1981-1995) grows with technology; and Generation Z (1996-...) has been named the group living together with technology.^{1,5} Generation Y constitutes an average of 1.8 billion people worldwide.⁶ As of 2017, Generation Y people included the youngest 18 and the oldest 37 years old. Covering the childhood years of the 1980s and the youth years of the 1990s, generation Y grew up with multichannel televisions and was adapted by the internet.⁷ The most distinctive feature of generation Y is its passion for technology and the internet. Generation Y members, also known as the media generation, are actively using social media networks that exceed two billion in the world.^{1,5,7} Generation Y generally uses the media to obtain short-term information to address health concerns. Additionally, the mental health of Generation Y mothers (95%) is positively impacted by social media.^{8,9} Social media usage differs between genders as well as across generations. There were fewer women than men in the three groups of a study.^{10,11} Mothers (80%) reported that their social media usage was almost every day.⁸ According to a cohort study, women use social media within an hour of birth, and they also use a phone while feeding their baby.¹²

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In the literature, new media have gained importance in health promotion and protection among mothers. In a study conducted by Arabacı et al., 8.5% of mothers actively use the media as an information source about their babies' and children's care.¹³ Generation Y mothers can quickly obtain information about their own health and that of their children on the internet. The information obtained from the internet, according to the sites used, can cause undesirable consequences for mothers' health.^{9,14} Research has shown that when mothers obtain information from the right website, baby health is positively affected by the internet about breastfeeding and vaccination issues.^{15,16} However, according to another study, the communication of mothers in forums, blogs, and Facebook groups expresses negative emotions more than positive emotions. Additionally, the research suggests media literacy courses for mothers to use these sites effectively.¹⁷

To reduce the adverse effects of media on health, researchers have proposed many strategies, such as editing the content of media and restricting children's media usage.^{7,4,18,19} Media literacy is a process of individuals' exposure to the media and understanding of economic, political, and technological dimensions in the production and transfer of messages they encounter.²⁰ Media-literate individuals can evaluate media messages from specific criteria and a critical perspective, and they can protect themselves from misinformation.²¹ Because of uncontrolled fake information, people can refuse medical nursing care or treatment practices.¹⁵ People can easily access different speciality knowledge and professional resources so that media can have unpredictable consequences, such as anxiety.²² Additionally, many mothers may prefer media, which they can access more quickly, instead of receiving information from related healthcare professionals. When information pollution on the internet is taken into account, incorrect and incomplete information both affect the health of mothers, infants and children.⁹ According to a systematic review by Tang et al., technological information and communication are effective in improving breastfeeding in nursing interventions.¹⁶ Nurses will be able to use the counseling and education process more effectively by taking into account all these features of the generation Y mother, and they can also raise awareness of mothers' access to correct information. In the literature, there are a limited number of studies on generating differences in mothers' media literacy and obtaining health information from social networks.²³ Additionally, there is limited evidence to guide nursing practices regarding generation after the emergence of the internet.²⁴ This research was carried out to determine media literacy and social media network usage in health issues of generation Y mothers born between 1981 and 1995 (23–36 years old in 2017).

METHODS

Study Design and Location

This study was a cross-sectional descriptive study that took three months. This study was conducted in the years when the use of social media started to intensify (15 Nisan 2017-15 Temmuz 2017). The survey was conducted in five Facebook groups via online questionnaires. The Facebook group names include Baby Care (Bebek Bakımı), Everything for Maternity and Baby Care (Anne Ve Bebeğe dair Ne Varsa), Mother Goose (Anne Kaz), Notes from Mother Midwife (Anne Ebe'den Notlar), and Mother and Baby (Anne ve Bebek Sayfası). Researchers contacted admins in groups and allowed them to share questionnaires. The reasons for the choice of these groups are as follows: Group members are mothers. They are health-related to mother and child care. Their aims are similar, promoting healthy growth in infancy. Additionally, mothers share their experiences.

Sample Description

In the selection of the mothers who participated in the study, a purposeful convenience sampling method was used for the mothers who met the inclusion criteria. This sampling method can be used in a cross-sectional study design. Researchers sent a message to all groups with the keyword 'mother' in their social network. Researchers included those for whom we could obtain written consent from the group administrators. These groups were those for which written consent was provided in the selection of the groups. The research universe comprises 1332 mothers, who are members of five Facebook groups. Name of those groups: Baby Care (N=124), Everything for Maternity and Baby Care (N=592), Mother Goose (N= 401), I Notes from Mother Midwife (N=114), Mother and Baby (N=101).

Sample selection was performed via a purposive sampling method. This study was conducted with 175 generation Y mothers. The inclusion criterion was as follows: The participation of mothers was voluntary, and the researchers were contacted via email. The researcher provided scale score information for each mother after they responded to the questionnaire by a researcher. Since generation Y mothers were included in this study, the birth interval was determined. Mothers born between 1981 and 1995 were invited to participate in the study. Mothers who did not meet the inclusion criteria were considered among the exclusion criteria.

Ethical Statements

The committee was consulted with the Gazi University Ethics Commission (Date: 11.04.2017 Code: 2017-147) to evaluate the ethical suitability of the study. We obtained written approval from the Admin of each Facebook group. One-to-one contact was made with the mothers participating in the study, and the media

literacy levels of the mothers were notified of the mothers via e-mail. The content of the online Google form included a written consent form and detailed information about the research.

Data Collection

An online/electronic questionnaire was used to collect the data. The data were collected with 'online questionnaire forms' created with Google Form support. The participants who wanted feedback from us provided their e-mail addresses. We informed them about the results at the end of the research. The data collection form includes two parts. The first part comprises 12 questions prepared by researchers and aimed at determining internet usage habits. Additionally, age, social media usage information and child care information are included in the first part. The second part comprises a 17-item media literacy level determination scale.

The Media Literacy Level Determination Scale was developed by Karaman and Karatas. The scale, which consists of 17 items, is a five-point Likert type.²¹ The scale items are graded as 1=Never, 2=Rarely, 3=Sometimes, 4=Often and 5=Always. The first dimension's name is "knowledge" and includes the 2nd, 3rd, 4th, 5th, 6th, 9th and 11th items. The Cronbach's alpha of the knowledge dimension was found to be .721. The second dimension's name is "Analyze and React" and includes the 7th, 8th, 12th, 13th, 14th and 15th items. The Cronbach's alpha of the analyze and react dimension was found to be .705. The third dimension's name is "Judging, Viewing Implicit Messages" and includes the 1st, 10th, 16th and 17th items. The total Cronbach's alpha value of the scale was found to be .840.²⁵ In this study, the coefficient alpha value was identified as .929. The scale does not have a cutoff point, but when interpreting it, we referred to the levels in similar studies.

Statistical Analysis

The data were obtained via SPSS version 20.0 (IBM SPSS Corp., Armonk, NY, USA). Among the descriptive statistics, the number, percentage and median distributions were used to analyze the results. Nonparametric tests were used to compare media literacy scale medians and participant characteristics; the Mann-Whitney U and Kruskal-Wallis tests were used to compare the median scores. The Mann-Whitney U test was used for pairwise comparisons. The Kruskal-Wallis test was used for three comparisons. Additionally, Tamhane was selected for the post hoc tests.

In cases where the significance value is $P < .05$ to determine the direction of the between-group binary comparison of the groups with Tamhane's T2 test, one of the post hoc tests was performed for the comparison groups with unequal variances.

RESULTS

According to the data in Table 1, the mothers' mean age in this study was 30.3 ± 4.6 years. A total of 50.9% of mothers had a university degree or above. A total of 94.3% of the mothers were married; almost half of them had adequate family affluence perceptions. The majority (90.3%) of the participants had a nuclear family. A total of 86.3% of the mothers had been using the internet for more than five years, and 82.3% of them had connected to the internet via telephone. More than half of the mothers (51.4%) used the internet for 1–3 hours daily. Social media sites (59.4%) are used on the internet the most. Facebook was used more than the other options were used (27.7%). A total of 27.9% of mothers use the internet to communicate. A total of 27.0% of the mothers stated that they use the internet to learn new information, and 60% of them believe that this information is reliable. A total of 36.4% of mothers felt sad or restricted when they did not use the internet (Table 1).

Table 1. Demographic characteristics and internet usage habits of the mothers (N=175)

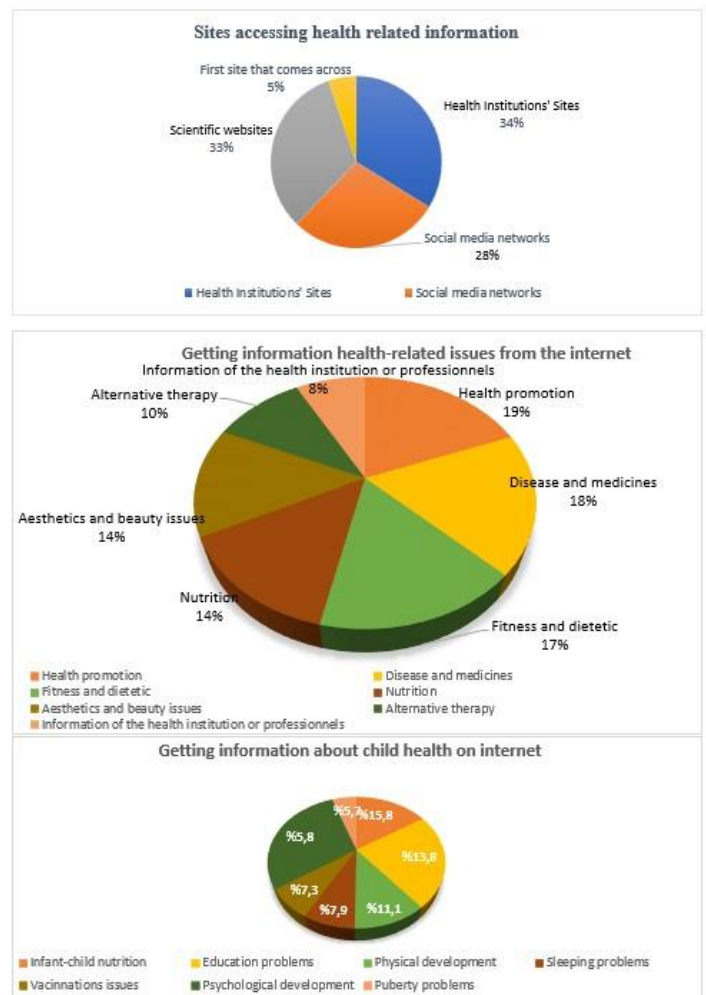
Demographic characteristics, internet usage habits	mean \pm sd	n	%
Mean age	30.3 \pm 4.6		
Status of education			
Primary and secondary school graduate		23	13.1
High school graduate		63	36.0
University and above graduate		89	50.9
Marital status			
Married		165	94.3
Unmarried		10	5.7
Family affluence perception			
Adequate		91	52.0
Partly adequate		52	29.7
Inadequate		32	18.3
Family type			
Nuclear family		158	90.3
Extended family		17	9.7
Internet usage tool			
Telephone		144	82.3
Computer		31	17.7
Internet usage year			
2 years and less		7	4.0
3-4 years		17	9.7
5 years and more		151	86.3
Daily internet usage hour			
Less than 1 hour		18	10.3
1-3 hours		90	51.4
More than 3 hours		67	38.3

Sites used on the internet*		
Web 2.0 (Facebook, WhatsApp, Instagram, blogs, phone applications...)	298	59.4
News sites	96	19.0
Shopping sites	80	15.8
Others	21	5.8
Web 2.0 preference, *		
Facebook	164	21.8
WhatsApp	159	21.1
Instagram	130	17.2
YouTube	94	12.5
Twitter	54	7.1
Google+	53	7.0
Others	98	13.3
The aim of internet use*		
Communication	145	27.9
To be aware of the developments related to daily life	143	27.3
Learning something new information	141	27.0
Spending time	93	17.8
Finding the information they receive online as reliable.		
Yes	105	60.0
No	70	40.0
Emotional state when unable to access the Internet		
Does not feel any change in emotional state	113	64.6
Feeling restrained and unhappy	62	35.4

* Mothers could select more than one answer

For health-related issues, more than half of the mothers preferred reliable sites to obtain information: health institutions (34%) and scientific websites (33%). However, 28% of mothers accessed social media networks, and 5% of mothers accessed the first site that came across them to obtain information on health-related issues. These health-related issues are health promotion (19%), disease and medicines (18%), fitness and diet (17%), nutrition (14%) and aesthetics and beauty issues (14%). With respect to baby care-related issues, mothers generally obtain information about infant-child nutrition (15.8%), education problems (13.8%), physical development (11.1%), sleeping problems (7.9%) and vaccination issues (7.3%) (Figure 1).

Media Literacy and the Internet Usage about Baby Care:



Figures 1. Internet usage features of mothers on health-related issues (N=175)

The median score of the Generation Y mothers' Media Literacy Level Determination Scale is 68.00. The median score of the Generation Y mothers' knowledge subscale is 29.00, the median score of the Analyze and React subscale is 22.00, and the median score of the Judging Viewing Implicit Messages subscale is 16.00 (Figure 2).

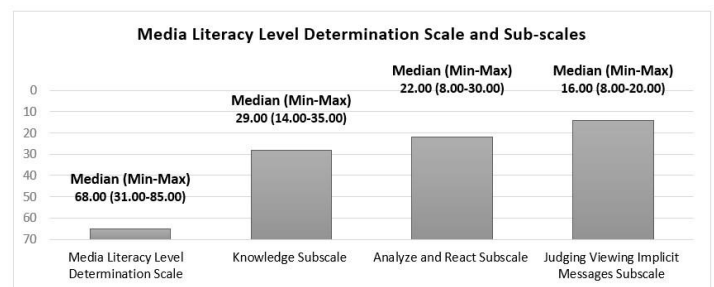


Figure 2. Median Scores' Media Literacy Level Determination Scale and Sub-scales

The levels of media literacy and education are statistically significant ($H=11.655$; $P = .003$). According to Tamhane's T2 test results, primary-secondary school graduates and high school graduates are statistically significant ($P = .016$). Additionally,

primary-secondary school graduates and university graduates ($P = .007$) are statistically significant. The difference is due to primary-school graduates (Table 2).

Table 2. Media literacy level determination scale median scores by socio-demographic characteristics

	n	%	Media Literacy Level Determination Scale Median (Min-Max)	U,H P
Education status**				
Primary and secondary school graduate	23	13.1	56.00 (31-85)	H=11.655 P = .003*
High school graduate	63	36.0	66.00 (34-85)	
University and above graduate	89	50.9	68.00 (35-85)	
Marital status				
Married	165	94.3	67.00 (31-85)	U=815.0 P = .943
Unmarried	10	5.7	69.00 (48-80)	
Family affluence perception				
Adequate	91	52.0	68.00 (34-85)	H=4.163 P = .125
Partly adequate	52	29.7	67.00 (31-85)	
Inadequate	32	18.3	63.00 (36-85)	
Family type				
Nuclear family	158	90.3	67.00 (34-85)	U=901.0 P = .204
Extended family	17	9.7	68.00 (31-85)	
Internet usage tool				
Telephone	144	82.3	66.00 (31-85)	U=1877.0 P = .124
Computer	31	17.7	70.00 (52-84)	
Internet usage year**				
2 years and less	7	4.0	54.00 (50-74)	H=9.402 P = .009*
3-4 years	17	9.7	61.00 (31-85)	
5 years and more	151	86.3	68.00 (34-85)	
Daily internet usage hour				
Less than 1 hour	18	10.3	65.00 (34-85)	H=4.869 P = .648
1-3 hours	90	51.4	67.00 (38-85)	
More than 3 hours	67	38.3	68.00 (31-85)	
Finding the information they receive online as reliable.				
Yes	105	60.0	67.00 (31-85)	U=3610.0 P = .826
No	70	40.0	68.00 (34-85)	
Emotional state when unable to access the Internet				
Does not feel any change in emotional state	113	64.6	67.00 (34-85)	U=3326.5 P = .582
Feeling restrained and unhappy	62	35.4	68.00 (31-85)	

P value ($<.05$) are with * Tamhane's T2 test **

The levels of media literacy and internet usage year are statistically significant ($H=9.402$; $P = .009$). According to the results of Tamhane's T2 test, internetInternet use for five years or longer and internetInternet use for 3-4 years are statistically

significant ($P = .014$). Using the internet for five years or longer and using it for two years or less is statistically significant ($P = .020$). The difference between the groups is caused by the group using the internet for five years or more (Table 3).

Table 3. Groups post-test scores Tamhane's T2 test multiple comparison test results.

Groups	Groups compared	MD	SE	P
Education status				
Primary and secondary school graduate	High school graduate	-9.69	3.24	.016
	University and above graduate	-10.38	3.12	.007
High school graduate	Primary and secondary school graduate	9.69	3.24	.016
	University and above graduate	-.68	1.77	.973
University and above graduate	Primary and secondary school graduate	10.38	3.12	.007
	High school graduate	0.68	1.77	.973
Internet usage year**				
2 years and less	3-4 years	-.52	5.06	.999
	5 years and more	-8.06	3.80	.020
3-4 years	2 years and less	.52	5.06	.999
	5 years and more	-7.54	3.57	.014
5 years and more	2 years and less	8.06	3.80	.020
	3-4 years	7.54	3.57	.014

Additionally, internet usage time varied according to the education level of the mothers. The education level of mothers and their internet usage were statistically significant ($X^2 = 22.339$; $P = .001$).

DISCUSSION

The level of media literacy significantly affects the social life and health decisions of individuals. In particular, the introduction of social media, which is called new media, increases the dissemination of information and increases the importance of media literacy.^{4,18} In this study, the scale scores were between 17 and 85, indicating that the media literacy of the mothers was moderate. According to one study, the media literacy level of the participants was stated to be intermediate.²⁶ Our study results are supported by another study in the literature. It is among the requirements of media literacy that the individual has information about media literacy and media and can analyze this information and realize its reaction as a result of detecting the implicit messages underlying the given message.²⁰ The current study revealed that the knowledge subscale score was at a medium level. A study was conducted by Arslan and Basel among 401 women.²⁷ They reported that the scores of the knowledge subscale, the analyze and react subscale and judgment subscale, which view the implicit messages subscale, supported our study results; scores obtained from the subdimensions could be said to be at a medium level with a similar interpretation. In the current study, among the dimensions, the scores of the knowledge subscale are the highest, and the mean scores of the judgment and implicit message subscales are the lowest. This might make it difficult for mothers to see the implicit information underlying

the messages. Generation Y mothers whose media literacy is at a medium level are in the risk group.

Nurses are important health professionals that support mothers in judging messages in the media and seeing the underlying messages. Providing training and consultancy services with media is effective for generation Y mothers. For example, a systematic review revealed that nurses' interventions via technology are effective for improving breastfeeding.¹⁶ According to another study, a social media-based nursing intervention improved vaccine-hesitant parents' attitudes.¹⁵ Nurses should consider the fact that Generation Y mothers can easily access media information while planning their consultancy. Using media, nurses can turn this situation into an advantage.

A previous study reported that the level of media literacy increases as the education level of an individual increases.²⁶ In this study, the educational status of mothers and media literacy were statistically significant, and the mean media literacy score of those with a high education level was high. Mothers with low education levels have low media literacy. They may be more negatively affected by information pollution in the internet environment. Nurses can prioritize mothers with low educational status in the educational consultancy services they provide on media literacy.

Phone usage rates have increased even over the years. The ability to actively connect to the internet has increased the rate of regular use.¹² In the present study, the level of media literacy and internet usage year were found to be statistically significant ($P < .05$). Similarly, Arslan & Basel reported the relationships between the internet and computer ownership and media

literacy.²⁷ The difference between the groups is due to the group using the internet for five years or more. Using the internet for many years may improve media usage awareness. This finding supports this argument in studies.^{10,12} People who have a high level of media literacy use the internet for many years. It is higher than that in the other groups. The same study revealed that it might affect the development of media usage awareness in individuals over time.

In the literature, generation Y mothers use media to relieve health concerns the most.^{9,27} In a study conducted by Frazer et al., it was determined that mothers prefer the internet for their baby-child nutrition. In this study, it was found that generation Y mothers felt the need to obtain information from the media about baby-child nutrition. In addition to the positive effect of the internet, the information obtained from the internet might negatively affect the health of mothers and babies.^{9,14} Nurses must provide mothers with satisfactory information about their health, especially infant-child care. They could direct mothers who use the internet intensively to appropriate sources of information. Thus, it can be ensured that mothers use the media more accurately on health issues.

The characteristics of generations are changing, and nurses provide health services. Each generation has different needs. In particular, the needs of mothers are important for nursing practices. It is essential to consider generation Y mothers in health education and consultancy services. Nurses need media usage skills, such as e-professionalism. Nurses could use technology in service delivery to support mothers in judging messages in the media and seeing the underlying messages. Nurses could evaluate the social media usage or experiences of mothers with respect to health. Nurses can provide information to mothers on how to find the right information from the internet. They could demonstrate official web sites about health. Nurses should prioritize mothers with low educational status in the educational consultancy services they provide on media literacy.

Study Limitations

The fact that the research was conducted only on Facebook groups and that the inclusion of individuals who agreed to communicate via e-mail increased the reliability of the study and limited the number of participants.

This study does not represent the universe due to the small number of participants and can only be generalized to the sample in which the study was conducted. In addition, the years in which the research was conducted were the years when Facebook groups were widely used. Different groups and social media networks may be preferred in future studies. New research can be conducted on this subject.

CONCLUSION

The media literacy level of Generation Y mothers was moderate, and they were in the risk group for accessing adequate and accurate information. Nurses can question the sources from which mothers obtain health information. Official social media groups and accounts can be opened under the leadership of nurses. They can direct mothers to more accurate and reliable websites and official social media accounts. The media literacy level differs according to educational status and internet usage time. The media literacy levels of university graduates and those who have been using the internet for more than five years are higher. Mothers frequently investigate disease and infant-child nutrition in social networks. Nurses could fall within more media technology via their affiliation official websites or official social media pages.

Ethics Committee Approval: Ethics Committee Approval for this study was obtained from Gazi University Ethics Committee (Date: 2017, Number: 4/147)

Informed Consent: Informed consent was obtained from the participants.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - FA, NB; Design - FA, NB; Supervision -NB; Resources -FA; Materials -FA, NB; Data Collection and/or Processing -FA; Analysis and/or Interpretation -FA ; Literature Search -FA, NB; Writing Manuscript -FA, NB; Critical Review -FA, NB;

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Utilizing Artificial Intelligence for Adaptive Scenario Development in Interprofessional Education

ABSTRACT

Artificial intelligence (AI) enabled scriptwriting for interprofessional education is a novel approach that develop realistic and complex educational scenarios for healthcare professionals. This method enhances the quality of interprofessional education and addresses pedagogical challenges that educators face.

One notable advantage of AI in scriptwriting is the ability to create scenarios that reflect diverse and dynamic patient interactions, enabling students to engage in realistic problem solving. AI algorithms can analyze vast amounts of data regarding patient cases, treatment protocols, and clinician workflows—This leads to the creation of highly contextualized scenarios that capture the nuances of interprofessional collaboration in healthcare settings.

Moreover, AI-enabled tools can facilitate personalized learning experiences by adjusting the complexity and content individual learner data. This adaptability ensures that each student can engage with material tailored to their specific knowledge level and learning objectives, thereby maximizing the learning experience.

However, despite these advantages, relying solely on AI for script development is limited. One significant concern involves the potential loss of human insight in crafting scenarios that are sensitive to the emotional and ethical dimensions of healthcare. While AI can manage data-driven aspects of scenario creation, the subtleties of human interaction, empathy, and ethical conflict resolution may not be fully captured in automated narratives. Consequently, educators must ensure that AI-generated content is supplemented with human oversight, incorporating real-world experiences and ethical considerations that enrich the learning process. Educators from various health professions must work together to ensure that scripts generated by AI reflect the complexities and interdependencies of real clinical scenarios—

AI-assisted scenarios offer adaptive and personalized learning experiences by tailoring content to learners' needs and professional roles. These systems can increase efficiency in scenario creation, enhance student engagement, and provide real-time, data-driven feedback. However, AI-generated content may lack the emotional depth and ethical nuance essential to interprofessional collaboration. Overreliance on AI also risks reducing critical thinking and creativity, while concerns such as algorithmic bias and data privacy must be carefully addressed to ensure equitable educational practices.

Keywords: Interprofessional Education (IPE); Scenario-Based Learning (SBL); AI-Assisted Simulation; Healthcare Collaboration; Medical Education Technology

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INTRODUCTION

Interprofessional education (IPE) is an interactive process that enables individuals from different professional groups “to learn with, from, and about each other” to enhance collaboration and improve the quality of care.^{1–6} This concept is referred to in the literature in various terms, such as multidisciplinary, multiprofessional, and interdisciplinary.^{7–9} Harden (1998) stated that this diversity arises from different approaches to educational philosophies.¹⁰

Interprofessional education is a critical instructional approach aimed at bridging gaps in healthcare services and enhancing patient care by strengthening teamwork among healthcare professionals.¹ Since the 1978 Alma-Ata Declaration, the World Health Organization (WHO) has emphasized the importance of teamwork in the healthcare sector and first addressed the necessity of IPE within this framework. The 1988 report, *Learning Together to Work Together for Health*, promoted the integration of IPE into healthcare systems, whereas the 2010 action plan provided evidence that IPE fostered effective collaboration through well-structured implementations.^{3,11} However, the implementation of IPE presents significant challenges, particularly for educators in the curriculum development process. These challenges can be analyzed across institutional, pedagogical, individual, and ethical dimensions.^{12–19} The integration of IPE into healthcare education programs requires institutional structures to be receptive to this transformation.

Challenges Encountered in the Interprofessional Education Model

Microlevel challenges (individual factors): When evaluated from the perspective of students and educators, differences in professional identity perceptions pose a significant barrier to the integration of IPE. Students from different professional groups tend to preserve their own professional identities, which may lead to the development of biases against other professions and hinder collaboration. Students may perceive their own discipline as superior to or independent from other professions, which can reduce their willingness to engage in teamwork. Additionally, a lack of sufficient knowledge among educators regarding IPE, the absence of mentors in practice, and the inadequacy of faculty development programs further complicate the implementation of IPE.^{18,20–22}

Among both educators and students, there is a common perception that IPE poses a threat to traditional educational models. This perception may negatively impact the success and sustainability of a program.¹⁶

Mesolevel challenges (institutional and pedagogical factors), institutional culture, the content of educational programs, and the workload of academic staff are among the factors that hinder the integration of interprofessional education (IPE). Owing to the traditional single-disciplinary structure of educational institutions, there are limitations in developing and implementing programs that involve multiple professional groups. The misalignment of academic calendars among different health disciplines and the challenges of synchronizing curricula make the implementation of IPE more difficult. Additionally, ensuring time and space coordination across faculties emerges as a significant logistical barrier. One of the greatest challenges is involving educators from different professions who have no prior knowledge of the interprofessional education model and expecting them to coordinate their teaching programs accordingly. In less developed regions, a lack of faculty members with diverse academic expertise, insufficient institutional support for the IPE teaching model, and inadequate financial and structural resources to sustain IPE significantly limit its integration.^{7,15,16,23}

With respect to pedagogical challenges, for interprofessional education (IPE) to be effectively implemented, curricula must be appropriately designed. However, establishing shared learning objectives among students from different disciplines and ensuring curricular alignment are challenging processes. For IPE to be successful, educators must adopt student-centered and collaborative teaching strategies. Additionally, to implement scenario-based and problem-based learning approaches effectively, a sufficient number of educators must be trained and adapted to this process.^{12,14,15,20,21,24} Furthermore, the creation of clinical scenarios that accommodate two or more disciplines is essential for students from different health professions to develop their clinical skills and teamwork competencies together. However, the development of clinically accurate, relevant, appropriately complex, and moderately conflicting scenarios is highly time-consuming and remains a significant barrier to the advancement of IPE.^{15,16}

Macrolevel challenges (political and cultural factors): The lack of support for an interprofessional collaboration culture hinders the integration of interprofessional education (IPE) into the education system.²⁵ Traditional educational and professional paradigms often promote disciplinary separation rather than interprofessional collaboration, further complicating IPE implementation.¹⁶ Another challenge is that the integration of IPE into curricula is often considered independent of accreditation processes, making its institutional adoption more difficult.²⁶

Ethical challenges: One of the most significant ethical challenges in the IPE process is the ambiguity of interprofessional roles and boundaries. A lack of clarity regarding the roles of different professional groups may lead to power imbalances between patients and healthcare professionals. Additionally, ethical conflicts may arise regarding the sharing of sensitive information, such as patient data, and how confidentiality principles should be applied across different disciplines. Among both students and educators, issues related to fairness and representation in decision-making processes are frequently encountered.^{13,15}

There are strong strategies to overcome these challenges. For interprofessional education (IPE) to be effectively implemented, various approaches have been proposed, including institutional support mechanisms, learner-centered models (e.g., scenario-based learning), technological innovations, and faculty development programs.^{9,15,21,24,25,27–29} To ensure the sustainable implementation of IPE, institutional support and interfaculty collaboration are of paramount importance. IPE implementation teams, composed of faculty members and institutional administrators, can facilitate the continuity of interprofessional education within institutions. Additionally, curricular alignment strategies should be developed to harmonize educational programs across different faculties, synchronize schedules, and establish shared interprofessional learning modules. These steps encourage students to engage in early interprofessional learning experiences, fostering collaborative competencies from the outset of their education.¹⁵

Learner-Centered Approaches

Student-centered approaches play a crucial role in enhancing the effectiveness of interprofessional education (IPE). These approaches foster communication and teamwork skills while helping students develop an understanding of different professional perspectives. One of the key components of student-centered learning is the use of high-fidelity simulation scenarios. These scenarios closely replicate real clinical environments, allowing students to gain hands-on experience in applying their knowledge.^{30,31}

Learning through real-life scenarios helps students understand the roles of different healthcare professions and encourages them to develop a patient-centered perspective.³² In particular, the use of medical error scenarios can increase the effectiveness of IPE in patient safety education, strengthening students' critical thinking skills.³³

Peer-supported learning has been shown to enhance analytical and problem-solving skills through scenario-based peer learning.²⁴ Improving their understanding of the challenges faced by different healthcare professionals can also help students develop greater empathy and team cohesion.³⁴ Furthermore,

debriefing sessions allow students to reflect on their experiences and reinforce learning outcomes.³⁵

Digital learning environments have become an increasingly valuable resource in interprofessional education. Großer et al. (2020) reported that digital education scenarios enable students to observe challenges encountered by different professional groups, thereby fostering interprofessional understanding and dialog.³⁶ Additionally, the use of chat functions in digital learning platforms enhances student engagement and interaction by facilitating active participation in various scenarios. These platforms also accommodate various learning styles, allowing students to learn at their own pace.³⁶

Problem-based learning (PBL) promotes interprofessional interaction through group work while simultaneously improving students' clinical problem-solving skills.^{37,38}

Another essential component of student-centered learning is constructive feedback and mentorship. Ko et al. reported that educators who adopt a motivating and supportive attitude help strengthen collaboration among students and enhance the learning process.³⁸

Technology and AI-Assisted Education

Technology and AI-assisted applications in interprofessional education (IPE) provide students with more flexible and effective learning opportunities. Through AI-powered virtual patient scenarios, simulation-based education enables students to interact with different professional groups and gain realistic clinical experiences.³⁹

Additionally, e-learning and hybrid models can overcome physical coordination challenges, allowing IPE to reach a broader audience.⁴⁰ These technological solutions facilitate interprofessional education regardless of location, enhance accessibility and support the learning process.

Faculty Development Programs and Cultural Transformation

To ensure that educators can effectively deliver interprofessional education, faculty development programs should be implemented, and academic staff should receive specialized training.^{15,27}

Moreover, transforming institutional education and work culture into a collaborative structure will help expand the adoption of interprofessional education.³⁷ Mentorship programs can further support interdisciplinary collaboration by encouraging knowledge and experience exchange among experts from different professional backgrounds.⁴¹

These initiatives will strengthen the integration of IPE in both academic and clinical settings, fostering a sustainable interprofessional learning culture.

Interprofessional Education and Scenario-Based Learning

Interprofessional education increasingly recognizes the importance of scenario-based learning (SBL) in developing collaborative competencies among healthcare professionals. This pedagogical approach significantly enhances students' ability to communicate effectively and resolve conflicts in clinical settings by engaging them in realistic scenarios that prepare them for interprofessional teamwork.

The scenarios used in IPE can be real, simulated, virtual, or text-based, and they are often incorporated into undergraduate education and continuing professional development through small group activities or simulated patient encounters. By focusing on real-world clinical applications, SBL enhances the relevance of learning for healthcare professionals.^{32,40}

Although terms such as scenario-based learning (SBL), case-based learning (CBL), problem-based learning (PBL), experiential learning, simulation-based learning, and situation learning are often used interchangeably in the literature, this study refers to SBL as the primary framework.^{32,40}

SBL aims to help healthcare professionals understand their roles and responsibilities, improve collaboration, enhance awareness of professional identity and teamwork, and develop clinical and critical reasoning skills.⁴⁰ As a student-centered approach, SBL involves intensive interaction among participants, encouraging knowledge construction through group collaboration. The educator serves as a facilitator, while students engage in analyzing complex situations together.

Scenarios integrate clinical, social, and basic sciences into real-world contexts, allowing students to connect theoretical knowledge with practical applications. The primary goal of SBL should be not only to teach profession-specific knowledge, skills, and attitudes but also to foster competencies that apply across all healthcare professions, such as roles and responsibilities, teamwork, professional identity, and collaboration.¹⁵

SBL enhances interprofessional interaction by incorporating scenarios that involve multiple professions. Students from different disciplines work together within a shared scenario to achieve common learning objectives, fostering problem solving via a team-based approach. By encountering realistic situations, students gain practical experience in collaboration with professionals from other disciplines. Additionally, SBL can alleviate faculty shortages, as it requires less direct instruction from educators than traditional lecture-based methods do and encourages students to engage in self-directed problem solving. Furthermore, SBL allows students to experience not only their own professional roles but also the roles of other disciplines,

helping to reduce biases and develop a more positive perspective toward teamwork. While SBL does not provide a direct solution to ethical challenges (e.g., role ambiguity, patient confidentiality), it can be adapted to include ethical decision-making scenarios, allowing students to experience ethical dilemmas and develop ethical awareness.^{24,42–45} As a pedagogical approach, scenario-based learning is particularly effective in addressing educational and individual challenges in IPE. It promotes collaboration, enhances understanding of different professional roles, and increases students' readiness for teamwork. However, while SBL is a valuable tool, it is not sufficient on its own to address institutional and ethical challenges. Therefore, additional strategies should be used in these areas.

In this context, the active use of scenarios in IPE facilitates collaborative learning among students from different disciplines and creates a learning environment that promotes teamwork in healthcare education.

AI-Assisted Scenario Writing in Interprofessional Education

The effectiveness of scenario-based simulation training in interprofessional education (IPE) is well documented. Studies in the literature demonstrate that creating a safe learning environment enhances students' confidence, making them more willing to collaborate on shared treatment plans during simulations.³⁰ Çelik et al. emphasized that actively engaging students in scenario-based learning fosters a deeper understanding of and preparedness for interprofessional collaboration.²⁴ Similarly, research by Lunde et al. highlights that simulation scenarios, particularly in acute care settings, improve interprofessional collaboration competencies.³⁰ These findings indicate that students not only develop clinical skills but also enhance teamwork and communication abilities.

AI-driven language models are increasingly being integrated into scenario writing, assessment, and instructor-supported feedback mechanisms. In medical education and other scientific disciplines, AI enhances simulation-based training and case-based learning sessions, enabling the development of realistic clinical scenarios.⁴⁶

The application of AI-assisted scenario development in IPE represents a significant advancement in healthcare education. AI technologies analyze students' learning needs, personalize learning experiences, and create dynamic learning environments that foster interprofessional collaboration.

AI-assisted scenarios in interprofessional education: advantages and disadvantages

Compared with traditional educational materials, AI-powered scenarios in interprofessional education (IPE) offer both advantages and disadvantages. The advantages of these methods are related primarily to the customizability and adaptability of the scenarios. Disadvantages often stem from the lack of human intuition and creativity in AI-generated content. Understanding these strengths and limitations is essential for optimizing AI integration into IPE curriculum design.

Advantages of AI-assisted Scenarios

One of the greatest advantages of AI-assisted scenarios is their ability to adapt content to individual learner needs. AI tools can analyze student performance and behavioral data to create personalized learning experiences. This adaptive learning environment can provide scenarios tailored to students' professional backgrounds and learning objectives, helping them develop a deeper understanding of the subject matter.³⁰ For example, role-reversal scenarios can increase students' empathy by allowing them to experience different roles within the healthcare system.³⁴

Additionally, AI can accelerate the scenario development process and reduce educators' workload. Traditional scenario writing is often time-consuming and may be limited in diversity because of educators' constraints in imagining various clinical situations. However, AI can generate many scenarios in a short time, thereby improving the diversity and accessibility of educational resources.⁴⁷ Moreover, AI-driven learning materials can be continuously updated and adapted to new developments in the healthcare field.³⁵

AI-assisted scenario development can also enhance student engagement and motivation. Lunde et al. emphasized the importance of carefully evaluating scenario complexity and providing challenging yet achievable learning opportunities that encourage active student participation.³⁰ Guraya et al. suggested that AI can analyze students' learning histories and preferences, enabling scenarios to be better tailored to their needs.⁴⁸ This process allows for the development of scenarios that more accurately reflect real-world healthcare situations, thereby improving competency acquisition.

Another key advantage of AI-supported educational scenarios is their ability to optimize feedback processes. AI systems can analyze student performance during simulations and provide real-time, adaptive feedback. A study by Pack et al. revealed that postscenario debriefing sessions play a crucial role in improving participants' understanding of team dynamics and individual roles.⁴⁹ The integration of AI-driven analytical systems can

facilitate more targeted debriefing sessions, enhancing the development of interprofessional collaboration skills.

Disadvantages of AI-assisted Scenarios

On the other hand, AI-assisted scenarios also present some significant disadvantages. One of the primary concerns is the lack of emotional depth and contextual understanding. While AI can generate technically accurate simulations on the basis of data, it may fail to fully capture the authentic interpersonal dynamics and emotional nuances that are essential for effective interprofessional collaboration.³⁶ In contrast, traditional scenarios, which are developed on the basis of educators' personal experiences and real-life cases, may offer a richer learning experience in this regard. Moreover, overreliance on AI could diminish students' critical thinking and creativity. If all the scenarios are AI-generated, the learning environment may become overly standardized, failing to adequately prepare students for unpredictable real-world situations. Educators emphasize that an effective learning process requires students to analyze complex cases and develop solutions within uncertainty.⁵⁰

Additionally, the ethical implications of AI-assisted scenarios must also be considered. Issues such as data privacy and algorithmic bias remain key challenges in the integration of AI into educational systems. Ensuring that AI-driven learning environments promote equity is crucial for maintaining an inclusive and fair educational experience.⁵¹

CONCLUSION

AI-assisted scenario development in interprofessional education holds transformative potential for health profession education. Through data analytics, content generation incorporating diverse perspectives, and adaptive feedback mechanisms, AI can create realistic and interactive scenarios that enhance interprofessional collaboration and teamwork.

AI-driven scenarios offer significant advantages, such as personalized learning experiences and greater efficiency in the educational process. However, certain limitations must also be considered, including the lack of human intuition, challenges in fully capturing the emotional context, and constraints in fostering critical thinking.

A balance between the opportunities provided by AI and the expertise of human educators is essential for the continued advancement of interprofessional education. As AI technologies continue to evolve, they will further refine health profession education strategies, ensuring that future healthcare professionals are trained more effectively.

To illustrate the practical application of AI in interprofessional education, we chose to develop a scenario using ChatGPT, a widely accessible and versatile AI language model. ChatGPT was selected because of its ability to generate coherent, contextually relevant, and adaptive content on the basis of user-defined prompts. The researchers involved in this study have professional experience in medical education and have received formal training specifically on the use of AI tools, including ChatGPT, in educational design. This background provided the necessary competence to utilize the tool effectively and responsibly. By presenting a sample IPE scenario created with ChatGPT, we aim to provide a transparent and practical example of how generative AI can support educators in scenario development while also clarifying its capabilities and limitations in healthcare education contexts.

Example of ChatGPT-supported interprofessional education scenario writing

Below is a step-by-step example of writing an IPE scenario via ChatGPT.

1. Define the Scenario's Purpose and Learning Objectives

First, identify which interprofessional competencies the scenario aims to develop:

- Roles and responsibilities
- Communication
- Teamwork and collaboration
- Patient-centered care
- Critical thinking and decision-making
- Understanding of ethical and professional roles
- Patient safety and quality improvement

2. Identify the Target Audience and Professional Groups

To ensure the effectiveness of the IPE scenario, the following healthcare professionals should be involved:

- Medical students
- Nursing students
- Pharmacy students
- Physiotherapy students
- Social workers

The inclusion of different disciplines will shape the core problem of the scenario and the approach to patient care.

3. Choosing the Scenario Type

Decide how the scenario will be presented:

Prompt (P)1	I want to write a digital scenario to be used in a learning environment where medical, nursing, and pharmacy students learn together and from each other. The scenario should be aligned with the interprofessional education (IPE) approach. The scenario topic should involve a 78-year-old female patient who develops bloody diarrhea as an adverse effect of an antibiotic prescribed for an upper respiratory tract infection. The learning objectives of the scenario are: Understanding the roles and responsibilities of healthcare professionals Enhancing communication among different disciplines Promoting patient-centered care The scenario should be designed as a virtual patient consultation.
Answer (A)1	The following structure may be suitable for your scenario: Digital Scenario: Patient Management through Interprofessional Collaboration

- Real patient case
- Simulation scenario
- Role-playing scenario
- Digital/virtual scenario

4. Define the Scenario Structure and Key Stages

Each scenario should consist of three fundamental phases:

A. Introduction (Scenario Overview and Context)

- **Patient Information:** Age, sex, medical history, and social factors.
- **Context:** Define the setting (e.g., emergency department, ICU, outpatient clinic, community health center).
- **Initial Findings:** Presenting complaints, physical examination findings, and laboratory results.

B. Intervention and Interprofessional Interaction

- **Roles of different professional groups:** What tasks will each profession undertake?
- **Communication:** How will students collaborate with various team members?
- **Decision-Making Process:** How will the treatment plan be developed?
- **Patient Approach:** How will the team interact with the patient and family?

C. Evaluation and Feedback

- Assessment of communication and teamwork
- Clinical decision-making processes
- Patient safety and ethical considerations
- Feedback from both instructors and students
- Possible alternative scenario outcomes and reflective questions for students

Development of an AI-Assisted Scenario and Discussion Questions for an Interprofessional Approach to Course Planning

Before the scenario is written, certain aspects of lesson planning must be determined.

For example:

Topic: Adverse drug reactions

The healthcare professionals involved, namely, pharmacists, nurses, and physicians, were selected as the healthcare disciplines to be included in this topic.

Patient characteristics: 78-year-old female

Reason for seeking care: Bloody diarrhea

Preparation for developing a scenario and discussion questions for interprofessional education via ChatGPT.

1. Scenario Introduction

Patient Profile:

- **Name:** Fatma Hanım
- **Age:** 78
- **Chief Complaint:** Started taking antibiotics **five days ago** for an upper respiratory tract infection; now presents with **bloody diarrhea**.
- **Past Medical History:** Hypertension, osteoporosis, history of urinary tract infection (6 months ago).
- **Current Medications:** Antihypertensive drug, calcium supplement, newly prescribed antibiotic.

2. Scenario Stages

1. Patient Consultation (Virtual Patient Interaction)

- Medical, nursing, and pharmacy students **evaluate the patient either sequentially or collaboratively**.
- Information is gathered regarding the **patient's complaints, medication use, and medical history**.

2. Interprofessional Discussion

- **Medical student:** Discusses **diagnosis and differential diagnoses**, considering the possibility of *Clostridioides difficile* (C. diff) infection.
- **Nursing student:** Assesses the patient's **fluid status, bowel movements, vital signs, and care plan**.
- **Pharmacy student:** Evaluates **antibiotic use history, potential adverse drug reactions, and possible drug interactions**.

3. Patient-Centered Care Decision

The team collaboratively formulates a patient management plan:

- **Should the antibiotic be discontinued?**
- **Should probiotic support be recommended?**
- **Is hospitalization required?**

4. Feedback & Evaluation

- Feedback is provided to students based on the **virtual patient's responses**.
- Students complete a **short self-assessment form** to evaluate the learning process.

P2 In the scenario, the learning environment should follow the patient's journey after noticing bloody diarrhea:
 Pharmacy Visit: The patient first seeks help from a pharmacist after noticing symptoms.
 Family Health Center Visit: The patient is then referred to a nurse and physician at a primary care center for further evaluation.
 Each profession will have specific responsibilities regarding adverse drug reaction assessment, medication discontinuation, and pharmacovigilance reporting to the Ministry of Health.

A2 Your scenario establishes a strong framework for interprofessional education. The process can be detailed as follows:

Digital Scenario: Patient Presenting with Bloody Diarrhea

1. Scenario Initiation: Pharmacy Visit

The patient (**Fatma Hanım**) notices **bloody diarrhea** and goes to the **nearest pharmacy**.

- **Pharmacy Student:**
 - Assesses the patient's **symptoms and medication history**.
 - Suspects *Clostridioides difficile* infection as a potential antibiotic-associated complication.
 - Recommends that the patient visit a **primary care physician**.
 - **Pharmacovigilance (adverse drug reaction reporting):** Reminds the patient of the responsibility to report the adverse effect to the **Ministry of Health**.

2. Family Health Center (Primary Care) Visit

Following the pharmacist's recommendation, **Fatma Hanım** visits the family health center (FHC).

- **Nursing Student:**
 - Evaluates the patient's **hydration status and vital signs**.
 - Assesses the **severity of diarrhea** and reports findings to the **physician**.
 - Identifies the patient's **need for education and counseling**.
 - **Pharmacovigilance:** Discusses the necessity of reporting the adverse drug reaction.
- **Medical Student:**
 - Obtains a **detailed medical history** and performs a **physical examination**.
 - Assesses whether the **bloody diarrhea is due to Clostridioides difficile infection**.
 - Determines whether the **antibiotic should be discontinued**.
 - **Pharmacovigilance:** Completes the **adverse drug reaction report** to be submitted to the **Ministry of Health**.

3. Conclusion & Evaluation

- Students reflect on interprofessional communication.
- The importance of patient-centered care is emphasized.
- Learning outcomes are reinforced through feedback.

P3 Add points of role overlap (challenges) between the pharmacist, nurse, and physician so that students can engage in a deeper discussion about their roles and responsibilities.

A3 To develop a strong interprofessional education (IPE) scenario, the following role overlaps (challenges) can be incorporated:

Areas of Role Overlap (Challenges) and Discussion Points

1. Pharmacist vs. Physician – Discontinuation of the Antibiotic

- **Pharmacist:** Should the pharmacist, upon recognizing a potential adverse drug reaction, directly advise the patient to discontinue the antibiotic, or should they refer the patient to the physician?
- **Physician:** To what extent should the physician rely on the pharmacist's assessment before seeing the patient in person and making a decision on discontinuing the antibiotic?
- **Discussion Points:**
 - What is the **scope of the pharmacist's authority** in medication management?
 - What should be done when a patient consults a **pharmacist before seeing a physician**?

2 Nurse vs. Physician – Responsibility for Adverse Drug Reaction Reporting

- **Nurse:** Should the nurse, after identifying an adverse drug reaction, independently submit a **pharmacovigilance report**, or should they inform the physician and wait for them to take action?
- **Physician:** As the healthcare professional responsible for **diagnosing the patient**, should the physician view pharmacovigilance reporting as solely their responsibility?
- **Discussion Points:**
 - How should **adverse drug reaction reporting be shared** in a clinical setting?
 - Should **nurses have the authority** to submit pharmacovigilance reports independently, or should this always be physician-led?

3 Pharmacist vs. Nurse – Who is Responsible for the First Clinical Intervention?

- **Pharmacist:** If the pharmacist identifies **signs of dehydration**, should they recommend **oral rehydration therapy**, or should they **immediately refer the patient to a healthcare facility**?
- **Nurse:** When the patient arrives at the healthcare facility, how should the nurse assess the **appropriateness of the pharmacist's recommendations**?
- **Discussion Points:**
 - What are the **boundaries of pharmacists' and nurses' roles** in **patient education and early intervention**?
 - In what cases should **pharmacists provide clinical recommendations**, and when should intervention be left to **nurses or physicians**?

These role overlaps will enhance students' understanding of both **interprofessional collaboration and their respective professional responsibilities**.

P4 What statements can these three healthcare professions use to demonstrate effective and ineffective communication when discussing the patient's condition and the necessary interventions?

A4 To help students recognize effective and ineffective interprofessional communication in the scenario, the following example statements can be included:

1 During the discussion between the pharmacist, nurse, and physician

✓ Effective Communication Statements:

- *"I believe this patient may have developed an antibiotic-related adverse reaction. What do you think?"* (Encouraging exchange of ideas and shared decision-making)
- *"Considering the patient's symptoms, should we determine the best approach together?"* (Promoting teamwork and collaboration)
- *"Let's proceed with the pharmacovigilance report, but ensure that we all stay informed about the process."* (Emphasizing shared responsibility)
- *"Let's assess this patient together and integrate the perspectives of each profession."* (Highlighting interprofessional collaboration)

✗ Ineffective Communication Statements:

- *"I don't think the pharmacist needs to comment on this. Diagnosis is the physician's responsibility."* (Dismissing professional roles)
- *"I already know the answer; there's no need for discussion."* (Shutting down communication)
- *"This is not the nurse's responsibility; medication decisions are made by the physician."* (Excluding other professions from decision-making)
- *"Just prescribe the medication, and we will handle the rest."* (Authoritative, one-sided approach)

2 When communicating with the patient

✓ Effective Communication Statements:

- **Physician:** *"We are working as a team to address your condition. Our goal is to find the best solution for you."*
- **Pharmacist:** *"The antibiotic you are taking may affect the gastrointestinal system in some patients. We will consult with the physician and nurse at the primary care center to ensure the best approach for your care."*
- **Nurse:** *"We are here to support you in the best way possible. Now, we will assess your condition and provide the most appropriate care."*

✗ Ineffective Communication Statements:

- **Physician:** *"I prescribed this medication, but I don't know if the pharmacist caused this issue."*
- **Pharmacist:** *"You may have been prescribed the wrong antibiotic, but you should discuss this with your doctor."*
- **Nurse:** *"You went to the pharmacy first, but you should have come to us instead."*

These communication examples help students **grasp the importance of interprofessional teamwork** and develop **more effective communication strategies** in healthcare settings.

P5 What statements can these three healthcare professions use to express their awareness of each other's professional boundaries when discussing the patient's condition and necessary interventions?

A5 **Recognizing and Expressing Professional Boundaries in Interprofessional Teamwork**
Recognizing and expressing boundaries in interprofessional teamwork is essential. Below are examples of **effective and ineffective communication statements** that students can use during the scenario to acknowledge each other's professional limits.

1 Effective Communication Statements (Respecting and Acknowledging Professional Roles)

✓ Pharmacist:

- "I noticed that the antibiotic may be causing an adverse reaction, but making a definitive diagnosis is within your expertise. That's why I referred the patient to you." (**Acknowledging the physician's authority in diagnosis**)
- "I can provide detailed information about potential drug adverse effects, but the decision to continue or discontinue treatment should be made by you." (**Deferring treatment decisions to the physician**)

✓ Nurse:

- "I have been closely monitoring the patient's fluid balance and symptoms. I can share these findings with you so we can evaluate the diagnosis and treatment together." (**Emphasizing the nurse's role in patient monitoring and care**)
- "Our pharmacist colleague highlighted potential drug interactions, and we should take that into account." (**Recognizing the pharmacist's expertise**)

✓ Physician:

- "The pharmacist's evaluation of potential drug interactions is highly valuable. I will consider this information when formulating the treatment plan." (**Acknowledging the pharmacist's contribution**)
- "The nurse provided a critical assessment of the patient's fluid balance, which will help us shape our management plan." (**Validating the nurse's role in patient care**)

2 Ineffective Communication Statements (Disregarding Professional Roles or Overstepping Boundaries)

✗ Pharmacist:

- "This antibiotic has serious side effects, so you should stop taking it. You don't need to consult a doctor." (**Overstepping the physician's authority in treatment decisions**)
- "Nurse, you don't need to consult me about how to care for the patient." (**Dismissing the nurse's expertise in patient care**)

✗ Nurse:

- "Since the doctor prescribed the medication, the decision is theirs alone. We just follow orders." (**Ignoring the nurse's role in active decision-making**)
- "There's no need to consider what the pharmacist says; we will follow the doctor's instructions." (**Disregarding the pharmacist's expertise**)

✗ Physician:

- "There's no need for pharmacists to report drug adverse effects. We already make the decisions." (**Dismissing the pharmacist's role in pharmacovigilance**)
- "Nurses can support the patient, but clinical decisions are entirely ours." (**Overlooking the nurse's role in patient management**)

These statements can be integrated into the scenario to help students recognize and respect **professional roles and boundaries**. This approach ensures a clearer understanding of each profession's **competencies and responsibilities**.

P6 Considering all the points mentioned above, write a detailed scenario for a 4-hour interprofessional education (IPE) session where medical, nursing, and pharmacy students will learn together. The scenario should include:
The roles and responsibilities of each profession
Patient care and communication strategies
Critical discussion questions to facilitate interprofessional dialog
Evaluation criteria to guide individual reflection at the end of the session

Final Product

Course title: Patient Care through Interprofessional Collaboration: Antibiotic Use and Adverse Effects

Course Duration: 4 Hours

Learning objectives:

1. Medical, nursing, and pharmacy students understand the importance of interprofessional teamwork.
2. Students discuss the roles and responsibilities of healthcare professionals in patient care.
3. They recognize effective and ineffective communication strategies.

4. They will understand the pharmacovigilance reporting process.

5. The significance of patient-centered care should be emphasized.

Scenario: The Case of Fatma Hanım

Patient Information:

- **Name:** Fatma Hanım
- **Age:** 78
- Her chief complaint was as follows: she had started taking antibiotics five days prior for an upper respiratory tract infection;

now, she presents with bloody diarrhea, fatigue, fever, and worsening abdominal pain.

- Past medical history: Hypertension, osteoporosis, history of ischemic stroke (2 years ago), and chronic kidney disease (stage 3).

- Current medications include antibiotics, antihypertensive drugs, vitamin D, aspirin, and **metformin**.

Phase 1: Pharmacy visit

Fatma Hanım notices **bloody diarrhea** and visits a **nearby pharmacy**.

Role of the pharmacist:

- The patient's **current medications and symptoms were evaluated**.
- **Antibiotic-associated adverse effects**, including the possibility of *Clostridioides difficile* infection, **should be considered**.
- **Diabetes and chronic kidney disease increase the risk of dehydration**.
- The patient was advised to visit a **primary care physician**.
- Reflects on the need for **pharmacovigilance reporting** to the **Ministry of Health** regarding adverse drug reactions.

Discussion Questions:

- Should the pharmacist recommend **the discontinuation of antibiotics**?
- Should the patient have consulted a **physician before visiting the pharmacy**?
- What are the **roles and responsibilities** of pharmacists in managing adverse drug reactions?
- How should **antibiotic dosing be adjusted for patients with kidney disease**?

Phase 2: Family Health Center Visits

Following the pharmacist's recommendation, **Fatma Hanım visits a family health center (FHC)**.

Role of the Nurse:

- The patient's **vital signs** were evaluated (temperature: 38.2°C, heart rate: 110 bpm, blood pressure: 90/60 mmHg).
- The patient's **hydration status** was assessed, and **oral rehydration therapy was recommended**.
- Reports findings to the **physician**.
- **Patient education and care planning should be provided**.
- Discusses the need for **pharmacovigilance reporting**.

Discussion Questions:

- How should **nurses contribute** to the treatment plan?
- Should **nurses take responsibility for reporting adverse drug reactions**?
- How should **hypotension and dehydration risks** be managed?
- How should **diabetic patients with bloody diarrhea** be treated?

Phase 3: Physician evaluation

Role of the Physician:

- A **detailed medical history** was taken, and a **physical examination was performed**.
- Assess the **risk of sepsis**.
- Whether the **antibiotic should be discontinued should be determined**, considering its potential effects on **kidney function**.

- **Appropriate fluid therapy** should be prescribed, and whether **hospitalization** is necessary should be evaluated.
- The **pharmacovigilance report** for adverse drug reactions should be completed.

Discussion Questions:

- How much should the **physician rely on the pharmacist's assessment**?
- What is the **nurse's role** in monitoring **patient progress**?
- How should a **patient with suspected sepsis** be managed?
- How does **interprofessional collaboration improve patient care**?

Phase 4: Interprofessional discussion

Students from different disciplines collaborate to develop a **patient management plan**.

Role conflicts and discussion points:

1. **Pharmacist vs. physician:** who is responsible for **stopping the antibiotic**?
2. **Nurse vs. Physician:** Who should report **adverse drug reactions**?
3. **Pharmacist vs. nurse:** Who should **conduct the initial clinical assessment**?
4. **Hospital Referral Decision:** Which healthcare professional should determine **the need for hospitalization**?

Communication considerations:

- **Effective Communication Examples:** Collaborative decision-making, seeking input from others.
- **Ineffective Communication Examples:** Dismissive attitudes and lack of consultation.

Phase 5: Individual Reflection and Evaluation

At the end of the session, the students engaged in **individual reflection** and answered the following questions:

Individual reflection questions:

1. **How did I perceive my role** in this scenario?
2. **How do I evaluate the impact** of interprofessional collaboration on patient care?
3. **What did I learn from healthcare professionals** outside my field?
4. **How do I assess my communication skills** during the scenario?
5. **What is my key takeaway** regarding patient-centered care?

Course Outcomes:

- Students **understand the importance of interprofessional collaboration** among healthcare professionals.
- They will recognize **the impact of communication on patient care**.
- They observe that **effective teamwork and shared responsibilities improve patient outcomes**.
- They analyze the **pharmacovigilance reporting process** and discuss the roles of each profession.

Conclusion:

This version presents a **more complex patient case** to encourage students to engage in **in-depth discussions on clinical decision-making** and interprofessional collaboration.

AI and Technology Disclosure

This study utilized ChatGPT-4.0 for scenario design and discussion question generation. All AI-generated content was reviewed and

validated by subject matter experts to ensure accuracy and relevance.

Peer-review: Externally peer-reviewed.

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