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# The effect of COVID-19 patient care and emergency response interprofessional training on COVID-19 knowledge, perception, behavior and readiness for care

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**Abstract**.
**BACKGROUND:** During the COVID-19 pandemic, the need for Interprofessional Education (IPE) and collaborative practices have gained even more importance.
**OBJECTIVE:** The aim of this study is to evaluate the impact of IPE on COVID-19 on students' knowledge, perceptions, behaviors and readiness for care regarding COVID-19.
**METHODS:** The study followed a single-group pre-/post-test semi-experimental research design. The sample consisted of 435 students studying Elderly Care/Home Patient Care/First and Emergency Aid programs. The students' perception of interdisciplinary education was evaluated at the beginning of the study.
**RESULTS:** The students were given an online COVID-19 Patient Care and Emergency Response IPE that lasted five hours and was split into two parts. The perception of interdisciplinary education was significantly higher among female students and first and emergency students before receiving IPE. Before and after IPE, the knowledge level scores of the students who did not receive IPE were found to be higher than those who did. After the training, the students' knowledge levels, readiness for care and their perceptions of control towards the COVID-19 pandemic increased statistically significantly ($p < 0.001$).
**CONCLUSION:** The students' knowledge levels and perceptions of control surrounding the pandemic may grow as a result of the IPE given about COVID-19 during the pandemic, when IPE became more important, and students may feel more prepared to care.

Keywords: COVID-19 pandemic, healthcare professionals, interprofessional communication, interprofessional education

## 1. Introduction

Interprofessional cooperation in the field of health is the collaboration of two or more healthcare providers to provide quality healthcare services [1, 2]. Interprofessional education (IPE) is at the forefront of the multidisciplinary collaboration needed to support quality health care worldwide [3]. In recent years, due to the COVID-19 pandemic all over the world,

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the focus of care has further increased the need for a patient-centered and interprofessional team-oriented approach. This approach requires interprofessional collaboration and specialized skills of the professionals involved [4]. Therefore, to ensure effective collaboration in health care, some academics suggest that IPE be adopted as a strategy for all healthcare students, noting that IPE will improve interprofessional collaboration in clinical practice. In addition, to increase interprofessional cooperation during the COVID-19 pandemic, university students were provided with interprofessional training by establishing virtual workshops and the results were evaluated [3, 5]. Academics have been researching innovative methods in this field to present in the online application environment during the pandemic. However, evidence of online IPE programs in which health students learn together in a team-based environment is extremely limited. This research will serve as a starting point for determining the strategy to be used in the trainings that will be offered to promote the interprofessional collaboration of students who want to work in healthcare facilities.

As the challenges caused by the COVID-19 pandemic continue to grow, it is mandatory that clinical caregivers work in close coordination with professionals from different disciplines, departments and healthcare sectors. Moreover, interprofessional collaboration creates a great synergy that motivates healthcare team members to provide quality care to patients and their families in an efficient and safe manner. To ensure this synergy in professional life, training for university students in the field of health care during the pandemic period can be effective in ensuring the readiness of students for quality care [6, 7].

It has been proven by several studies that the perception and attitude of university students during the COVID-19 period increased their professional concerns [8, 9]. To understand the changes in the lives of students, and to reveal their attitudes towards the disease with evidence-based methods, it is extremely important to determine the correct health policies, their readiness and their interprofessional cooperation.

In addition, interprofessional cooperation enables healthcare professionals to increase their knowledge and skills, improve patient outcomes, and decrease health expenditure [10]. At the same time, IPE plays a key role in communicable diseases and in the training of the healthcare team who will take care of these diseases [11]. For this reason, IPE and practices should be integrated into the curricula of healthcare students. The early adaptation of students to IPE also provides opportunities for them to communicate and learn from each other [12]. The smooth delivery of care for both communicable and non-communicable diseases can be achieved through interprofessional collaboration practices between healthcare professionals. Thanks to the training the students received before graduation, these students can realize more collaborative practices in their clinical life. In particular, communicable diseases require teamwork that includes surveillance, immunization, containment, treatment and interventions to change social determinants [12]. The World Health Organization concluded that the main problem affecting patient safety is the lack of communication and coordination [13]. In several research studies, it has been found that the behaviors that negatively affect patient safety are not due to individual or technical reasons, but that the problems are rather system-based. One of the most effective methods in gaining teamwork skills is interprofessional education that starts in the early stages [14–16]. According to the groups that did not receive interprofessional education, teamwork was found to be more qualified. In addition, it has been shown that there is a decrease in medical errors, an increase in the competence of health professionals, compliance with protocols in emergency services and patient satisfaction [17]. Thus, interprofessional training was planned for Elderly Care, Home Patient Care and First and Emergency Aid students on the care of the COVID-19 patient and the implementation of emergency interventions. For the IPE on COVID-19, how it affected students' knowledge, attitudes and readiness to care for COVID-19 was evaluated. The students' perception of IPE at the beginning of education was also evaluated. This research is the first of its kind to investigate the evolution of IPE for healthcare students in Turkey throughout the COVID-19 pandemic. With this study, IPE was given for the first time among 2-year associate degree healthcare professionals in Turkey. This study is key in terms of proving that these programs should be included in IPE in the preparation of course curricula.

Hypotheses for the research: University students studying in the field of care and emergency response (answering emergency calls, performing medical services and transporting patients to medical facilities) will participate in COVID-19 Patient Care and Emergency Response Interprofessional Training.

H1: Increases knowledge of COVID-19.

H2: It changes their view of the COVID-19 pandemic and their attitudes toward it.

H3: It improves their emergency response and COVID-19 patient care readiness.

## 2. Methods

### *2.1. Research design*

A single-group pre-/post-test quasi-experimental research approach was used in this study. The study was completed in September 2021. The study's sample included 463 students enrolled in Elderly Care, Home Patient Care, and First and Emergency Aid programs. The students participating in the study were informed about the study and an online informed consent form was obtained. The students were given an online COVID-19 Patient Care and Emergency Intervention Interprofessional Training that lasted five hours and was split into two online sessions:

1. Interprofessional Values/Ethics, Roles/Responsibilities, Interprofessional Communication, Teams, and Teamwork were discussed as key competencies for interprofessional cooperation practices [18].
2. There are fundamental difficulties linked to the emergency response and care of the COVID-19 patient that both occupational groups must address to achieve professional cooperation (care and emergency response).

Subject content included COVID-19 care and vaccines, personal protective measures, disinfection and waste management, related procedures in case of COVID-19 exposure of healthcare personnel, COVID-19 patient management, patient transfer, triage, sampling, Acute Respiratory Distress Syndrome (ARDS) prone position and COVID-19. It consisted of 19 patient resuscitations. The trainer discussed the importance of IPE, and complex medical situations or conditions that require healthcare professionals to work together with the students. Included in the conversations/topics was focusing on the need for interprofessional teamwork required to treat serious COVID-19 patients.

With the content of IPE, the students' knowledge, perceptions, attitudes and readiness for care regarding the care and emergency response practices of patients with COVID-19 before and after education were evaluated. The students' perceptions of interprofessional cooperation were also evaluated.

### *2.2. Study instruments*

Prior to the education, the age, gender, program, academic year and whether the student had already received education on this subject were asked using the "Introductory Information Form". Before and after the training, to measure the knowledge of the students, the "Interprofessional Information Form About COVID-19" was used, which was prepared by the researchers by scanning the literature and adhering to the content of the education. The form contained true or false statements about COVID-19. The highest and lowest scores were evaluated as percentages. To measure the attitudes of the participants, the "Perception and Attitudes Evaluation Scale towards the Coronavirus (COVID-19) Epidemic" was used. This scale consists of four sub-dimensions: perception of illness, perception of causes, perception of control and perception of avoidance. High scores indicate that the belief in that area is high [19]. The "Care Readiness Scale" was used to evaluate the readiness to care for the COVID-19 patient with interprofessional training. This scale is a 5-point Likert-type scale between the statements "I am not ready at all" and "I am completely ready". A higher the score means better readiness. At the end of the training, the "Interdisciplinary Education Perception Scale" was used to evaluate the students' perceptions about IPE. The 17 items and 3 sub-dimensions of the Turkish version of the scale are as follows: (1) Competence and autonomy (1st, 3rd, 5th and 7th items), (2) Perception of the need for cooperation (2nd, 6th and 8th items), and (3) Perception of existing cooperation (items 4, 9, 10, 11, 12, 13, 14, 15, 16 and 17). High scale and sub-dimension score totals indicate that the perception of interdisciplinary education is positive.

### *2.3. Data analysis*

The IBM SPSS (Statistical Package for Social Sciences) 15 software program was used to perform the statistical analysis. The use of parametric statistical methods requires strong assumptions about the data set. For this reason, it should be tested whether the assumptions are met or not. The most important assumption of the parametric statistical methods is that the data follows a normal distribution. The normality assumption was evaluated by

the Kolmogorov-Smirnov (KS) test. According to the results of the KS test, the data was far from a normal distribution. Therefore, non-parametric statistical methods should be applied to analyze the data set. An essential part of statistical analysis is to decide the appropriate method to be used to analyze the data set. Here, the Mann-Whitney U test was used for the comparison of two independent samples. If the number of samples is higher than two, then the Kruskal-Wallis H test was used for the comparison of more than two independent samples. If the null hypothesis of the Kruskal-Wallis H test is rejected, the multiple comparison test should be applied to test the mean difference between each group. The Bonferroni correction was used for multiple comparisons. Additionally, the correlation between the variables was analyzed using Spearman's correlation coefficient since the data did not follow a normal distribution. The Wilcoxon test was applied for the analysis of two dependent samples. Lastly, the McNemar test was applied for the paired nominal data. The significance level was determined as 0.05 for all calculations and interpretations.

## 3. Results

Male participants comprised 26.1% of the sample, while 73.9% of the participants were female. The distribution of the students according to the programs was 29.8% enrolled in the Home Patient Care program, 43.2% enrolled in the First and Emergency Aid program, and 27% enrolled in the Elderly Care program. Their distribution over the academic year for the students was 47.5% in the 1st year of study and 52.5% in the 2nd year of study. 15.8% of the participants stated that they had previously received training on patient care and emergency care, and 63.7% of those who received training stated that they had received this training from their own university. In addition, the average age of the participants was 20.6 years, with a minimum age of 18 years and a maximum age of 42 years (Table 1).

As a result of the reliability analysis of the scale of perception of interdisciplinary education, the Cronbach Alpha value was obtained as 0.971, and the reliability of the scale was evaluated as quite high. In Table 1, the results are shown on whether the change in the average score values of the participants' perception of interdisciplinary education varied according to their demographic characteristics. Accordingly, the average score of the perception of interdisciplinary education of the female participants was higher than the average score of the male participants ($p = 0.012$). The difference in the mean interdisciplinary education perception score values between program types was statistically significant ($p = 0.014$). According to the multiple comparison test, the mean interdisciplinary education perception score value of the participants enrolled in the First and Emergency program was higher than the participants enrolled in the Home Care program ($p = 0.011$). According to the variables of academic year ($p = 0.913$) and receiving education ($p = 0.719$), the difference between the average interdisciplinary education perception score values was not statistically significant.

In Table 2, the rates of correctly answered questions before and after the training are shown. Accordingly, the questions with a significant difference in the rates of correct answers after the training were questions 1, 5, 6, 8, 9, 10, 11, 12, 14, 15, 18, 19 and 20 ($p < 0.001$). The questions with the lowest and highest rate of correct answers were the 20th and 7th questions, respectively.

In Table 3, the relationships between the pre-education COVID-19 knowledge levels, The Preparedness for Caregiving Scale, Perceptions and Attitudes towards COVID-19 Pandemic Questionnaire and some demographic variables were examined. According to the type of program in which the participants were enrolled, the difference between the mean COVID-19 knowledge levels prior to receiving IPE was statistically significant ($p < 0.001$). According to the multiple comparison test results, this difference is due to the difference between Elderly Care and First and Emergency programs ($p < 0.001$). The average COVID-19 knowledge level of the participants enrolled in the First and Emergency program was higher than the knowledge level of the participants enrolled in the Elderly Care program. The difference between the mean pre-educational COVID-19 knowledge levels between participants whose academic year was the 1st year and those who were in their 2nd year was statistically significant ($p < 0.001$). The average pre-educational level of COVID-19 knowledge of the participants whose academic year was the 2nd year was higher than the participants who were in their 1st year of studies. In addition, participants who received training in patient care and emergency care had a higher average pre-education COVID-19 knowledge level than the participants who did not ($p < 0.001$).

The reliability of the caregiver readiness scale was examined, where the Cronbach Alpha value was 0.922 before the training and 0.947 after the training,

Table 1
Examination of pre-IPE interdisciplinary education perception score values according to some variables

| Variables and levels | | Participants N = 463 | % | M ± SD | |
|---|---|---|---|---|---|
| Gender* | Male | 121 | 26.1 | 68.231 ± 16.415 | **0.012** |
| | Female | 342 | 73.9 | 72.706 ± 13.888 | |
| Program** | Home patient care | 138 | 29.8 | 68.507 ± 16.364 | **0.014** |
| | First and emergency aid | 200 | 43.2 | 73.860 ± 12.908 | |
| | Elderly care | 125 | 27 | 71.168 ± 14.943 | |
| Academic year* | First year | 220 | 47.5 | 71.354 ± 15.048 | 0.913 |
| | Second year | 243 | 52.5 | 71.703 ± 14.415 | |
| Have you previously received education on COVID-19 from the faculty where you studied?* | Yes | 73 | 15.8 | 72.191 ± 14.098 | 0.719 |
| | No | 390 | 84.2 | 71.415 ± 14.830 | |

*Mann-Whitney U test; **Kruskal-Wallis H test.

Table 2
Comparison of COVID-19 knowledge levels before and after IPE

| Knowledge level assessment questions | Before | After | p* |
|---|---|---|---|
| 1. N95/FFP2 mask is one of the recommended personal protective equipment for people who will come into contact with the patient closer than one meter away. | 0.780 | 0.910 | **<0.001** |
| 2. Applications such as respiratory tract sampling, intubation, and aspiration of respiratory secretions are not procedures that create intense contact with the COVID-19 patient. | 0.750 | 0.790 | 0.110 |
| 3. It is sufficient to take standard precautions from admission to discharge of all patients diagnosed/suspected with COVID-19. | 0.550 | 0.540 | 0.863 |
| 4. If hands are visibly dirty, they should be cleaned with hand antiseptics. | 0.510 | 0.530 | 0.309 |
| 5. Continue to use the ventilator circuit for up to seven (7) days unless contaminated. | 0.210 | 0.370 | **<0.001** |
| 6. In order to dispose of used personal protective equipment, two separate medical waste buckets are kept at the entrance of the patient room and in the patient room. | 0.740 | 0.890 | **<0.001** |
| 7. Attention is paid to hand hygiene before and after contact with the patient (soap and water or alcohol-based hand antiseptics). | 0.960 | 0.960 | 0.719 |
| 8. All personal protective equipment must be worn in situations that cause aerosol release. | 0.840 | 0.920 | **<0.001** |
| 9. The order of wearing personal protective equipment: apron, mask, goggles/face protector and gloves. | 0.750 | 0.800 | **0.049** |
| 10. The order of removing personal protective equipment is: gloves, goggles/face protection, apron, mask. | 0.620 | 0.710 | **0.002** |
| 11. In cases of COVID-19 positive referral, N95 masks are generally preferred in the field. | 0.790 | 0.880 | **<0.001** |
| 12. Surface cleaners are generally used in ambulance cleaning after the transport of COVID-19 patients. | 0.270 | 0.480 | **<0.001** |
| 13. COVID-19 should be suspected in symptoms such as high fever, cough, shortness of breath, joint pain, and headache in the field. | 0.890 | 0.890 | 0.901 |
| 14. COVID-19 should be excluded in patients who received the COVID-19 vaccine two months ago and are now receiving COVID-19 complaints. | 0.710 | 0.810 | **<0.001** |
| 15. Ambulance air conditioners should be kept off, windows can be opened for referrals that are positive for COVID-19. | 0.570 | 0.720 | **<0.001** |
| 16. In the presence of any of the signs of fever, cough, respiratory distress, the patient is taken to the area reserved for COVID-19 by wearing a mask. | 0.850 | 0.890 | 0.054 |
| 17. The PCR test sample is only taken from the oral cavity. | 0.740 | 0.750 | 0.617 |
| 18. There is no update for COVID-19 in cardiopulmonary resuscitation practices. | 0.270 | 0.410 | **<0.001** |
| 19. Giving the prone position in ARDS increases the efficiency of ventilation. | 0.400 | 0.650 | **<0.001** |
| 20. Back compression is applied in the prone position in COVID-19 patients while they are in cardiac arrest. | 0.150 | 0.390 | **<0.001** |

*McNemar test.

and the reliability of the scale used was statistically quite high. The relationships between the participants' mean pre-training readiness to care scores and their demographic characteristics were examined. The average pre-education readiness to care score values of the male participants were higher than the female participants ($p = 0.018$). The mean score of readiness to care prior to education was higher for participants whose academic year was the second year ($p = 0.049$). In addition, the mean score of readiness to care prior to education was higher for the participants who received education than those who did not ($p = 0.011$). Considering the type of program, the difference between the mean scores of readiness to care prior to education was not statistically significant ($p = 0.277$) (Table 3).

Table 3
Examination of pre-educational scales according to some variables

| | COVID-19 knowledge levels | | The Preparedness for Caregiving Scale | | Perceptions and attitudes towards the COVID-19 Pandemic Questionnaire | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Disease perception | | Perception of causes | | Avoidance perception | | Perception of control | |
| Variables and levels | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* |
| Gender* | | | | | | | | | | | | |
| Male | 11.85 ± 3.88 | 0.089 | 29.082 ± 6.420 | **0.018** | 25.429 ± 3.132 | **0.011** | 51.99 ± 11.703 | 0.419 | 38.619 ± 10.72 | **0.020** | 37.859 ± 8.230 | 0.300 |
| Female | 12.52 ± 3.11 | | 27.464 ± 6.306 | | 24.801 ± 2.765 | | 51.213 ± 9.397 | | 41.219 ± 9.727 | | 37.415 ± 6.733 | |
| Program** | | | | | | | | | | | | |
| Home patient care | 12.33 ± 3.16 | **<0.001** | 28.434 ± 6.693 | 0.277 | 25.065 ± 3.132 | 0.850 | 50.898 ± 10.438 | 0.796 | 40.623 ± 10.661 | **0.037** | 37.652 ± 8.408 | 0.591 |
| First and emergency aid | 12.94 ± 3.06 | | 27.355 ± 6.200 | | 24.970 ± 2.689 | | 51.275 ± 9.740 | | 41.520 ± 9.479 | | 37.715 ± 6.358 | |
| Elderly care | 11.42 ± 3.74 | | 28.136 ± 6.253 | | 24.848 ± 2.887 | | 52.216 ± 10.111 | | 38.880 ± 10.111 | | 37.104 ± 6.866 | |
| Academic year* | | | | | | | | | | | | |
| First year | 11.71 ± 3.52 | **<0.001** | 27.277 ± 6.379 | **0.049** | 24.812 ± 2.747 | 0.375 | 51.181 ± 10.453 | 0.906 | 40.868 ± 8.859 | 0.634 | 37.159 ± 7.424 | 0.195 |
| Second year | 12.91 ± 3.06 | | 28.440 ± 6.321 | | 25.098 ± 2.987 | | 51.629 ± 9.675 | | 40.242 ± 11.028 | | 37.868 ± 6.887 | |
| Did you receive IPE?* | | | | | | | | | | | | |
| Yes | 13.90 ± 2.66 | **<0.001** | 29.631 ± 6.590 | **0.011** | 24.342 ± 2.572 | 0.104 | 51.972 ± 10.920 | 0.576 | 37.233 ± 10.603 | **0.005** | 36.712 ± 7.403 | 0.475 |
| No | 12.05 ± 3.37 | | 27.561 ± 6.282 | | 25.082 ± 2.917 | | 51.312 ± 9.883 | | 41.159 ± 9.834 | | 37.684 ± 7.099 | |

*Mann-Whitney U test; **Kruskal-Wallis H test.

The reliability of the scale for evaluating perceptions and attitudes towards the COVID-19 pandemic was examined with the Cronbach Alpha value. Cronbach Alpha values were obtained as 0.756 and 0.827 for pre-training and post-training, respectively. According to these results, the reliability of the scale was evaluated as high. The score values of each participant's sub-dimensions were calculated. Before the training, the relationship between the mean scores of the sub-dimensions of the scale and the demographic characteristics of the participants was examined. Accordingly, participants' average perception of illness prior to education did not differ according to the type of program ($p = 0.850$), academic year ($p = 0.375$) or whether they received education ($p = 0.104$). However, the male participants' average perception of illness prior to education was higher than the average of the female participants ($p = 0.011$).

The change in the mean pre-educational reason perception score values did not differ according to the variables of gender ($p = 0.419$), type of program ($p = 0.796$), academic year ($p = 0.906$) or having received education or not ($p = 0.576$). The mean avoidance perception score values of the female participants prior to education were higher than the mean score values of the male participants ($p = 0.020$). Participants who did not receive education had higher mean avoidance perception scores prior to education than participants who received education ($p = 0.005$). In addition, the difference between the mean avoidance perception score values according to the program type was statistically significant ($p = 0.037$). According to the results of the multiple comparison tests, the type of program that caused this difference was the First and Emergency program. The mean avoidance perception score values of participants enrolled in the First and Emergency program were higher than those enrolled in the Elderly Care program ($p = 0.033$). The mean perception of control prior to education did not differ according to the variables of gender ($p = 0.300$), program type ($p = 0.591$), academic year ($p = 0.195$) or having received education ($p = 0.475$) (Table 3). In Table 4, the relationship between the pre- and post-training COVID-19 knowledge levels, the difference between The Preparedness for Caregiving Scale, the Perceptions and Attitudes towards COVID-19 Pandemic Questionnaire scales and some demographic variables are examined. The percentage change between the participants' knowledge levels before and after the training was calculated. According to these results,

while the percentage change in the average knowledge level of the participants did not differ according to the variables of gender ($p = 0.453$), program ($p = 0.393$) or academic year ($p = 0.076$), it varied according to whether they had received education or not ($p < 0.001$). The percentage change in the average knowledge level of participants who had not received previous training in patient and emergency care was higher than those who had received previous training. The percentage change between the scores of readiness to care did not differ according to the variables of gender ($p = 0.241$), program type ($p = 0.166$) or academic year ($p = 0.918$). However, the change in the mean readiness to care score values of participants who did not receive education was higher than those who received education ($p = 0.033$). The percentage change in the control perception score values before and after the education did not differ according to the variables such as gender ($p = 0.453$), program type ($p = 0.966$), academic year ($p = 0.821$) or having received education ($p = 0.660$). In Table 5, the mean difference between the mean COVID-19 knowledge levels before and after the training, The Preparedness for Caregiving Scale, and the Perceptions and Attitudes towards COVID-19 Pandemic Questionnaire score values were investigated. The change in the average COVID-19 knowledge levels before and after the training was examined, and according to these results, it was determined that the average COVID-19 knowledge level of the participants after the training was higher than before ($p < 0.001$). The mean difference between the post-training readiness to care scores and the pre-education readiness scores was statistically significant ($p < 0.001$). The change between the mean perception of illness score values ($p = 0.833$), the perception of causes score values ($p = 0.913$), and the perception of avoidance ($p = 0.549$) before and after the education were examined, and no statistically significant difference was found. When the change in control perception was examined, it was determined that the change in the mean control perception before and after education was statistically significant ($p < 0.001$). The average control perception of participants after training increased compared to pre-training.

Table 4
Examination of the pre- and post-IPE scales according to some variables

| | COVID-19 knowledge levels | | The Preparedness for Caregiving Scale | | Perceptions and attitudes towards the COVID-19 Pandemic Questionnaire | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Disease perception | | Perception of causes | | Avoidance perception | | Perception of control | |
| Variables and levels | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* |
| Gender* | | | | | | | | | | | | |
| Male | 0.256 ± 0.705 | 0.453 | 0.083 ± 0.252 | 0.241 | –0.256 ± 3.817 | 0.316 | 0.942 ± 8.813 | 0.237 | –0.578 ± 11.115 | 0.697 | 0.127 ± 0.366 | 0.453 |
| Female | 0.203 ± 0.468 | | 0.116 ± 0.266 | | 0.049 ± 3.707 | | –0.383 ± 9.763 | | –0.4825 ± 9.923 | | 0.071 ± 0.198 | |
| Program** | | | | | | | | | | | | |
| Home patient care | 0.186 ± 0.398 | 0.393 | 0.086 ± 0.248 | 0.166 | –0.167 ± 3.091 | 0.293 | 0.761 ± 8.910 | 0.668 | –1.116 ± 10.603 | 0.449 | 0.1187 ± 0.360 | 0.966 |
| First and emergency aid | 0.175 ± 0.402 | | 0.113 ± 0.297 | | –0.120 ± 2.956 | | –0.005 ± 8.038 | | 0.2150 ± 8.633 | | 0.063 ± 0.147 | |
| Elderly care | 0.318 ± 0.799 | | 0.123 ± 0.218 | | 0.240 ± 5.223 | | –0.968 ± 12.062 | | –0.992 ± 12.044 | | 0.085 ± 0.244 | |
| Academic year* | | | | | | | | | | | | |
| First year | 0.265 ± 0.698 | 0.076 | 0.109 ± 0.272 | 0.918 | –0.118 ± 3.488 | 0.905 | 0.559 ± 9.194 | 0.455 | –1.282 ± 10.580 | 0.346 | 0.086 ± 0.269 | 0.821 |
| Second year | 0.172 ± 0.331 | | 0.106 ± 0.255 | | 0.037 ± 3.950 | | –0.576 ± 9.815 | | 0.193 ± 9.883 | | 0.085 ± 0.239 | |
| Did you receive IPE? * | | | | | | | | | | | | |
| Yes | 0.082 ± 0.227 | **<0.001** | 0.054 ± 0.221 | **0.033** | 1.191 ± 3.935 | **0.002** | 0.369 ± 9.478 | 0.719 | 0.753 ± 9.689 | 0.401 | 0.095 ± 0.302 | 0.660 |
| No | 0.242 ± 0.576 | | 0.117 ± 0.269 | | –0.266 ± 3.655 | | –0.113 ± 9.553 | | –0.743 ± 10.330 | | 0.084 ± 0.244 | |

*Mann-Whitney U test; **Kruskal-Wallis H test.

## 4. Discussion

This study examined the level of knowledge of healthcare students on care and emergency response practices for patients with COVID–19, on inter-

Table 5
Comparison of the score values of the scales before and after the IPE

| | COVID-19 knowledge levels | | The Preparedness for Caregiving Scale | | Perceptions and attitudes towards the COVID-19 Pandemic Questionnaire | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Disease perception | | Perception of causes | | Avoidance perception | | Perception of control | |
| | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* | M ± SD | *p* |
| **Before** | 12.34 ± 3.33 | **<0.001*** | 27.887 ± 6.369 | **<0.001*** | 24.965 ± 2.876 | 0.833* | 51.416 ± 10.044 | 0.913* | 40.540 ± 10.506 | 0.549* | 37.531 ± 7.148 | **<0.001*** |
| **After** | 14.29 ± 3.29 | | 29.995 ± 6.180 | | 24.928 ± 3.283 | | 51.380 ± 10.446 | | 40.032 ± 11.295 | | 39.725 ± 7.014 | |

*Wilcoxon test.

professional cooperation, on their perceptions and attitudes towards the COVID-19 outbreak, and whether they were ready to care for COVID-19 patients after graduation. In addition, the students were given IPE on this subject and the effect of the education was evaluated.

Students participating in the training received training in Home Care, Elderly Care, and First and Emergency Aid programs. Students' perceptions about interdisciplinary education were evaluated and it was concluded that First and Emergency Aid students were more ready for interprofessional learning than Home Care and Elderly Care students. In addition, when a comparison was made between the genders, it was seen that female participants' perceptions of interprofessional cooperation were higher. Collaboration between different professional groups is desirable in providing appropriate treatment for patients with a critical injury or acute illness. To maintain this cooperation, it is crucial to understand the abilities of other professions and what can be expected from them. Hallikainen et al. determined that IPE is an effective way to improve the emergency medicine knowledge and medical skills of medical and paramedic students [20]. In a similar study conducted in Australia, it was revealed that paramedic students exhibited positive attitudes towards interprofessional cooperation [21]. IPE of associate degree students is seen as an important precursor to developing health professionals who can work collaboratively. The study by Solomon et al. revealed that health field students benefited from the educational activity and the opportunity to interact with their colleagues from other professions [22]. In addition, with the understanding of IPE, students can reach a level where they can use different models of knowledge, so it is thought that it is key to include IPE courses in the curriculum of students studying in the field of health care [23]. In this study, interdisciplinary students in the field of health care were evaluated and according to the results of the study, it is recommended to add courses about interdisciplinary education to the curriculum of students in the field of health care to contribute to their working lives. Positive contributions can be made to interprofessional cooperation using IPE.

Before the IPE was provided, the knowledge levels of the students were evaluated and it was found that the knowledge levels of the students and the program they studied, their academic year of study and whether they received education or not. Those participants who studied in the First and Emer-

gency program, who were in the 2nd academic year, and who received training had higher scores. However, when the scores obtained after the education were compared with the scores obtained before education, it was revealed that only the students' previous education status was related. In addition, when the 20 questions about the symptoms, findings, prevention, emergency response and care about COVID-19 were evaluated separately, there were significant differences in 13 of them after the training and the knowledge level of the students increased. In parallel with this result, when the total scores of the COVID-19 knowledge levels of all students before and after the education were compared, it was seen that the knowledge levels of the students increased. Although there were differences between the departments before the training, the absence of differences between the departments after the education also shows that the education achieved its purpose as an IPE. No research has been conducted on the care and emergency response to COVID-19 patients thus far. Only students' knowledge levels were evaluated in previous studies. Therefore, this study is the first study of its kind on COVID-19 IPE.

In addition to the knowledge level of future healthcare professionals in emergency response and care to patients with COVID-19, interprofessional collaborations and communication also positively affect patient outcomes. In fact, the fact that healthcare professionals receive IPE during their university education enables them to provide higher quality healthcare services in their professional life [24]. In interprofessional cooperation, apart from the knowledge and training of the care staff, it is also important that the staff are ready to care for COVID-19 patients. Caregivers need to be prepared to minimize the negative effects of caregiving when not prepared as it is associated with feelings of fear, anxiety, stress, inadequacy and uncertainty [25]. Preparedness is the perceived readiness of the caregiver to meet the patient's physical and emotional needs and to manage the patient's emergencies and health care in general [26]. Negative effects can be limited by increasing the necessary knowledge of caregivers through training [27]. Therefore, in this study, it was aimed to increase students' readiness to care for COVID-19 patients after graduation by providing interprofessional training on COVID-19 emergency response and care. While it was revealed that before the education male students who were in their 2nd year of study and had received education before were more ready to provide care before and after training, it was found that only before training was more effective among these variables. In addition, a conclusion was reached that the level of readiness for care of the students increased after the interprofessional training of care for a patient with COVID-19 and emergency response. In addition, it was concluded that this rate increased even more after the interprofessional training of care and emergency response for a patient with COVID-19. Similarly, in the study conducted by Taib et al., in which the perceptions of medical students' readiness to provide care were investigated, it was concluded that students studying in the field of health care were sufficiently ready [27]. Unlike this study, there are also studies that conclude that caregivers are moderately prepared [28] or quite inadequately prepared [29]. This insufficient level of preparation is due to the lack of education necessary for caregivers to acquire care skills [30]. With this study, it can be said that the readiness of students in caring for COVID-19 patients with an IPE was increased. In the study, it was found that the IPE provided made students feel positive about teamwork and cooperation and that they valued learning opportunities that were shared with other healthcare students. Qualitative data analysis was also conducted in the same study, which showed that IPE increases awareness of the roles of team members, improves communication and collaboration, and can assist in providing better care for COVID-19 patients [31].

Another factor in the readiness of university students in the field of health care is the perceptions and behaviors they developed during the pandemic. For this reason, the perceptions and behaviors of students against the COVID-19 pandemic were also evaluated in this study. Prior to the education, a relationship was found between the perception of illness, which is one of the sub-dimensions of the scale, and only gender, and a relationship was found between the perception of avoidance and gender, the department the students studied, and whether they received education or not. While male participants perceived the disease more, it was concluded that female participants had a higher perception of avoidance. It was determined that the disease perception scores, which included the sub-dimensions of danger and contagiousness, were higher in male participants than in female participants. Although it was observed that the male participants in this study perceived COVID-19 as more contagious and dangerous than the female participants, this result differs from other studies in the literature [32–34]. Avoidance behaviors are personal

measures that have positive effects in preventing the spread of the pandemic [33]. According to the findings of this study, it was observed that the female participants' personal contact avoidance and average avoidance scores were higher than the scores of the male participants. However, it can be interpreted that females tend to restrict their touching behaviors in social environments for precautionary purposes during the pandemic[33]. In a cross-sectional study in which some avoidance behaviors caused by COVID-19 developed and behavioral changes in the relevant population were emphasized, most of the participants (more than 80%) limited their contact with people and planned to help with any contact (84.5%) was found to be cancelled. In addition, when a comparison was made between the genders, it was reported that males have thoughts such as avoiding going to the workplace/educational institution, being afraid of leaving their homes after the pandemic, or leaving work [35]. In this study, after IPE, there was an increase in the students' perception of control only against COVID-19. High scores obtained from the perception of control area, which includes macro control, personal control and inevitability sub-dimensions, mean that the perception of control is high, which indicates a positive picture [19]. In a very recent study conducted at the time of the pandemic in Turkey, the perception and attitude levels of participants towards the COVID-19 outbreak were quite similar when compared with this study's results [36].

## 5. Conclusion

The study's goal was to effectively prepare students who will care for COVID-19 patients during the pandemic by expanding their knowledge, by offering interprofessional training, and by improving their attitudes and behaviors toward the pandemic. Moreover, competencies such as interprofessional communication, cooperation, and responsibility were to be developed. With IPE, the students' knowledge of COVID-19 can increase, their perspectives and behaviors toward the pandemic can improve, and they can be more prepared to care for a COVID-19 patient and to respond to an emergency with interprofessional cooperation.

### *5.1. Limitations*

The limitations of the study are that: (1) interprofessional COVID-19 training was given in a single center, (2) the students had not received any interprofessional training on the subject previously, and (3) there were no examples of interprofessional practice in the fields of practice and education in Turkey. Therefore, the findings may not be generalizable to the whole of Turkey or to the whole world.

## Ethical approval

The study was approved by the Social and Human Sciences Ethics Committee of Bartın University (Protocol no. 2021-SBB-0308). The students participating in the study were informed about the study and signed an online informed consent form.

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## Conflict of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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