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The Impact of Covid-19 Pandemic on The Clinical Nutrition Interns Performances in King Abdulaziz Hospital- National Guard Health Affairs, Alahsa

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Abstract: COVID-19 has ruthlessly invaded the world causing a global disaster in many aspects and fields, particularly the field of medical and health education. Clinical Nutrition Internship Program, at KAMC-Al-Ahsa, has been affected by the precautionary measures in facing the pandemic of COVID-19. These measures may have their own impact on the performance of interns. Consequently, this study aims to determine the degree of such an impact of COVID-19 pandemic on interns' performance, and also to explore any possible reasons behind it. Therefore, we have proposed our research objectives as follows: 1-mesuring the significance of the impact of COVID-19 on the clinical nutrition interns' performances. 2- Identifying the reasons caused by COVID-19 that might explain any possible differences in the performance of clinical nutrition interns compared to the previous batch.

Method: A t test was used for the comparison between the scores of all interns' performance for two batches (during COVID-19 and the year before) as a causal comparative study by using the Clinical Nutrition Evaluation form to achieve our first objective. In addition, and to achieve the second objective, one to one interviews were conducted with all interns who have been doing their internship during COVID-19 to investigate and explore any challenges that might negatively influence their performance.

Results: Our findings showed that there was a significant difference in the total mean scores of interns' performance before and after COVID-19 (57.45 ± 1.761, 56.13 ± 1.058 respectively), with p-value 0.007 < 0.05, and a significant deference in Domain 1 (knowledge of work and working abilities) mean scores (27.75 ± 0.967, 26.43 ± 1.121 respectively) with p-value < 0.001 < 0.05 which means there was a significant impact on the clinical nutrition interns' performances caused by COVID-19 compared to the year before. However, the differences in Domain 2 (Quality and quantity of work) and Domain 3 (General performance) were not significant. The one to one interviews were also conducted, and the data was prepared, organized, transcribed and reviewed by the research team. Coding then took place by labeling and organizing our data to categorize all emerged themes and understand the relationship between them. Coverage, communication, attention, belonging, stress and anxiety, teamwork and quality of work were the main themes that can explain the reasons behind the difference in interns' performance before and during COVID-19.

Recommendations: according the results, we recommend Increase the training hours in the hospital, the practical training and lowering theoretical training, facilitate the communication with the patients and other health professionals with

lowering the physical contact, conduct more scientific meetings, workshops and seminars with the interns, provide more assignments and case scenarios for the interns to be done at home, provide additional courses for the interns to enhance their abilities in communication skills, stress management, time management and professionalism.

Keywords: COVID-19, Clinical Nutrition, Interns, Performance, Impact.

تأثير جائحة فيروس كورونا المستجد (كوفيد-19) على أداء متدربات التغذية العلاجية في مستشفى الملك عبد العزيز- الشؤون الصحية بالحرس الوطني، الأحساء

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المستخلص: لقد غزا فايروس كورونا المستجد (كوفيد-19) العالم بقسوة مما تسبب في كارثة عالمية في العديد من الجوانب والمجالات، لا سيما مجال التعليم الطبي والصحي. تأثر برنامج التدريب للتغذية الإكلينيكية بمدينة الملك عبد العزيز الطبية بالأحساء بالتدابير الاحترازية لمواجهة جائحة (كوفيد-19). قد يكون لهذه التدابير تأثيرها على أداء المتدربات. وبالتالي، تهدف هذه الدراسة إلى تحديد درجة تأثير جائحة (كوفيد-19) على أداء المتدربات، وكذلك استكشاف أي أسباب محتملة وراء ذلك. لذلك، لقد اقترحنا أهدافنا البحثية على النحو التالي: 1-قياس تأثير (كوفيد-19) على أداء المتدربين التغذية السريرية. 2- تحديد الأسباب التي سببها (كوفيد-19) والتي قد تفسر أي اختلافات محتملة في أداء المتدربين التغذية السريرية مقارنة بالدفعة السابقة.

الطريقة: تم استخدام اختبار ت (t-test) للمقارنة بين درجات أداء جميع المتدربات على دفعتين (خلال كوفيد-19 والعام السابق) كدراسة سببية مقارنة باستخدام نموذج تقييم التغذية السريرية للإجابة على سؤالنا الأول. بالإضافة إلى ذلك، وللإجابة على السؤال الثاني المقترح، أجريت مقابلات فردية مع المتدربات اللاتي أتممن تدريبهن خلال (كوفيد-19) للتحقيق واستكشاف أي تحديات قد أثرت سلبًا على أدائهن.

النتائج: أظهرت النتائج التي توصلنا إليها أن هناك فرقًا ملحوظا في متوسط الدرجات الإجمالية لأداء المتدربات قبل وخلال (كوفيد-19) (1.761 ± 57.45، 1.058 ± 56.13 على التوالي) ، مع قيمة (p-value) 0.05> 0.007 ، وأيضا في المجال 1 (معرفة العمل وقدرات العمل) في متوسط الدرجات (27.75 ± 0.967 ، 26.43 ± 1.121 على التوالي) مع قيمة (p-value) (0.05> 0.001>) مما يعني أنه كان هناك تأثير كبير على أداء المتدربين في التغذية السريرية الناجم عن الفايروس مقارنة بالعام السابق. ومع ذلك، فإن الاختلافات في المجال 2 (جودة وكمية العمل) والمجال 3 (الأداء العام) لم تكن كبيرة. تم إجراء المقابلات الفردية أيضًا، وتم إعداد البيانات وتنظيمها ونسخها ومراجعتها من قبل فريق البحث. ثم تم الترميز عن طريق وضع العلامات وتنظيم البيانات لدينا لتصنيف جميع الموضوعات الناشئة وفهم العلاقة فيما بينها. كانت الصعوبات في التغطية، التواصل، الانتباه، الانتماء، التوتر والقلق، العمل الجماعي، وجودة العمل هي الموضوعات الرئيسية التي يمكن أن تشرح الأسباب الكامنة وراء الاختلاف في أداء المتدربات قبل وأثناء (كوفيد-19).

التوصيات: وفقا للنتائج، نوصي بزيادة ساعات التدريب في المستشفى، والتدريب العملي وخفض التدريب النظري، وتسهيل التواصل مع المرضى وغيرهم من المهنيين الصحيين مع خفض الاتصال الجسدي، وإجراء المزيد من الاجتماعات العلمية وورش العمل والندوات مع المتدربين، وتوفير المزيد من المهام وسيناريوهات الحالات للمتدربين ليتم القيام به في المنزل، وتوفير دورات إضافية للمتدربين لتعزيز قدراتهم في مهارات الاتصال، وإدارة الإجهاد، وإدارة الوقت والمهنية.

الكلمات المفتاحية: كوفيد-19، التغذية العلاجية، تدريب تأثير.

Introduction

The 2019 novel coronavirus disease (COVID-19) was first isolated from biological samples in Wuhan, China, in December 2019. The virus was identified as a member of the coronavirus genus beta coronavirus, grouped with Severe Acute Respiratory Syndrome (SARS) and Middle East Syndrome Respiratory system (MERS). The virus spread internationally within one month of its first discovery, and was transmitted by close contact between humans. The World Health Organization (WHO) declared COVID-19 (SARS-CoV-2) a public health emergency of international concern on February 1, 2020. More than 200 countries have confirmed cases so far, including countries from Asia, Europe, North America and Middle East [(1)]. On the second of March, 2020, the first case of COVID-19 was confirmed in Saudi Arabia [(2)]. Within two months, the number of confirmed cases had reached 22,753 [(3)]. Collaboration between national, international, governmental, and nongovernmental bodies and the local communities are essential to control the spread of COVID-19. Preventive guidelines were issued by the WHO and CDC related but limited to hygiene and disinfection, individual and community hygiene, personal protective equipment (PPE), social distancing, households, COVID-19 testing, isolation and quarantine, and operational procedures at healthcare facilities and others [(4)]. Modifications of the preventive measures were declared for use at different national levels [(5)]. Obligatory preventive and control measures were carefully directed in Saudi Arabia [(6)].

This worldwide pandemic has made remarkable changes to almost every part of society; Medical education has been noticeably effected by these changes [(7)]. Most of the clinical learning has been inconclusively suspended in as per the American Association of Medical Colleges (AAMC) recommendations on 17 March 2020 [(8)], including visiting student learning opportunities (away rotations). Many medical schools have evolved virtual educational programs to proceed with clinical instruction until students can re-visit of emergency clinics and centers [(9)]. Nonetheless, absence of in-person clinical exposure may represent a challenge to medical students, especially with residency programs. Published studies by medical students have demonstrated a concurrent feeling of obligation to do their part by remaining at home, just as worry about how their education will proceed [(10, 11)]. Some medical students believe that COVID-19 pandemic will influence their decision of choosing their specialty, with these considerable concerns that they will not be able to explore specialties or have recommendation letters. With delayed suspension of clinical rotations, directed endeavors by clinical schools to address these concerns through improved virtual educational curriculum and strategies will be progressively significant [(7)].

Interns from the medical and other health sciences are not sure about the situation of their internships. There have been levels of behaviors practices by health associations with respect to internship

activities during the COVID-19 pandemic [12]. Lack of medical care workers have been an overload on the health institutions to train the interns on location during the COVID-19 pandemic to guarantee that appropriate training and safety standards are followed carefully [13]. Some health institutions have permitted interns to proceed with their internships on location to give them the necessary support and to include them in the COVID-19 efforts; this has raised safety worries among the interns, particularly the lack of medical supplies and personal protection equipment [13]. The onsite participation of the interns has varied, some interns have felt nervous, concerned, stressed, uncertain and defenseless against the infection, particularly those who have been engaged in direct interactions with confirmed or suspected COVID-19 cases [14]. Other interns were satisfied with the way of spending time on location as an authentic learning internship [15]. To lower the presence on location presence and to keep the guidance of social distancing, some health institutions have replaced their actual internships with virtual and online internship activities. Remote internship activities include online meetings, nonclinical researches, virtual conferences, recorded video conferences, distance work commitments and telemedicine [12-14]. Internship programs that apply this technique of training have flexible working hours and depend on active learning system [16].

The impact of COVID-19 on internship activities at health organizations in Saudi Arabia was also significant; however, most health institutions decided to proceed with the internships (76.53%), while others (23.47%) decided to suspend trainings. Health organizations have made various actions to succeed in dealing with the internship issues during the COVID-19 pandemic [17, 18].

For clinical nutrition internship during the pandemic period, there are a few challenges to be faced by the interns: a sudden increase in workload that strains their fitness; The fear of contracting COVID-19 and the anxiety of not being able to complete their clinical training on time puts tremendous pressure on them; Discord among colleagues due to a sudden change in workload and loss of contact with their friends, families and loved ones during this COVID-19 season affects them indirectly. In addition, they are required to complete their assignments with high expectations from their supervisors as they are expected to perform above the standard in order to become qualified clinical dietitians in the community. To protect oneself from this infectious disease, they must increase their vigilance during their work. All these unseen obstacles not only affect their mental states but their performance. However, the degree to which this pandemic is affecting clinical nutrition interns must be addressed to ensure their well-being is protected.

Interns in the clinical nutrition sectors are a major factor in this pandemic fighting war. This medical training is difficult and the interns must endure a high level of work stress while trying to gain more clinical experience. Clinical Nutrition Internship Program (CNIP) has been affected by the precautionary measures in facing the pandemic of COVID-19. Some modifications in the training have

been done to follow these precautionary measures; and for that, these measures may have their own effect on the interns' performances.

There were no previous studies to measure the impact of COVID-19 on the clinical nutrition interns specifically. Fort that, our aim in this study is to determine the degree of the impact of COVID-19 pandemic on the clinical nutrition intern's performances by comparing between the performances of the interns who finished their internship before COVID-19 and those who's their training was during COVID-19. The research will also include one to one interviews to identify the interns' challenges that may be faced during training with COVID-19. This study was conducted with the following objectives:

1- Measure the impact of COVID-19 on the clinical nutrition interns' performances.
2- Identify the challenges that were experienced by the interns during COVID-19.

Methods

Setting

The study was conducted in King Abdullaziz Hospital National Guard Health Affairs (KAH). KAH collaborates with local universities to run a clinical nutrition internship program that offers all near graduates in clinical nutrition advanced training in adult and pediatric clinical nutrition care.

KAH in Al Ahsa city is a 300-bed tertiary care center for the Eastern Region. In addition to facility expansions, the clinical nutrition department includes, and not limited to, nutritional management for inpatients and outpatients, tube feeding assessment, discharge planning, carbohydrate counting education and others. The CNI program was established to qualify the clinical nutrition graduates and fulfill the needs of the society in clinical nutrition. The mission of the program is to provide high quality health sciences training and community services that promote the health of society.

The preceptors are volunteer practitioners in clinical nutrition department who are willing to participate in the program. The interns match the schedules of the preceptors to best suit their needs. The preceptors are instructed to clinically educate and document the interns' performances. The program outcomes include:

- Prepare full nutritional assessment properly for the patient in clinics and the wards.
- Communicate with patients and other colleagues professionally in clinics and wards.
- Prepare feeding plan accurately for tube feeding patients in critical areas.
- Instruct the patient about hid nutritional needs properly in clinics and wards.
- Provide suitable discharge plane and follow up for the patients.

As the intern demonstrates proficiency, it is documented that they are allowed to perform these tasks without the direct observation of the tutors. It is expected that these interns can manage patients for an entire shift with tutors' backup by the end of the program.

Subjects

43 female clinical nutrition interns who graduated from Clinical Nutrition College, King Saud Bin Abdulaziz for Health Sciences, Al Ahsa were included in this research. The sample size included all the target population due to the small number of graduates. The previous data showed that the scores' standard deviation was 2.25. At α of 0.05, and power 80%, the expected mean score difference in performance between the two groups is 2. This was a non-probability consecutive sampling by including all available interns (n=43) 20 interns completed their internship the year before COVID-19, and 23 interns completed it during COVID-19. The inclusion criteria included:

- Graduates from Clinical Nutrition college, King Saud Bin Abdulaziz for Health Sciences, Al Ahsa.
- Clinical nutrition interns of the comparison group who finished their training before the pandemic.
- Clinical nutrition interns who have the training during the pandemic period.

Instruments

Two instruments were used to answer the two questions of this project as following:

1- A comparison of assessment records (before and during COVID-19) as a causal comparative study. The assessment has been done by five deferent evaluators for each intern to increase its reliability. The form of assessment is used by Clinical Nutrition College, King Saud bin Abdulaziz University for Health Sciences, Al Ahsa as an official performance assessment for the interns. It was categorized into three domains (***Knowledge of work and working abilities***, ***Quality and quantity of work*** and ***General performance***) and each domain has several points with total of 17 points for the whole assessment. These points were graded as 1: unsatisfactory, 2: good, 3: very good, 4: excellent. These point are arranged as following:

- Knowledge of work and working abilities (Domain 1)
  1- To what extent does the intern demonstrate capability of using scientific facts and skills as a basis for her performance?
  2- To what extent does she demonstrate a desire to learn more than just routine Aspects of the prescribed work?
  3- To what extent does the intern adjust to new work methods and conditions?
  4- How effective has the intern been in planning and organizing her work?
  5- How effective does the intern communicate in speech and writing?
  6- To what extent does the intern accept the maximum responsibilities for her work and volunteer for new assignments?
  7- How effective has the intern been in establishing working relationship with others?
  8- To what extent is the intern receptive to new ideas and information?
- Quality And quantity of work (Domain 2)

9- To what extent has the quality of her work matched the responsibilities given?
10- How efficient is the intern as to thoroughness and completeness of her work?
11- How successful has he/she been in meeting the requirements with respect to the amount of work within the time allotted?
12- Quantity (list) of work done

- General performance (Domain 3)

13- To what extent has the intern been punctual and complying with working hours of the institution?
14- How effective has the intern been in following departmental policies and procedures?
15- How effective were the intern's attitudes towards other members of the health care team and patients?
16- After finishing this training how well do you think the intern will be able to execute her responsibilities?
17- Over-all performance.

2- The study also included one to one interviews with interns who had their internship during COVID-19 to gain knowledge and understand the challenges that the interns faced during the pandemic period and its effect on their performance. The reason of choosing one to one interviews is to give the intern more liberty to express their concerns without feeling embarrassed by other colleagues. The interviews used open ended questions about the effect of COVID-19 on the internship program, the interns' performances and their recommendation from their point of views. (the interview questioner is attached)

Analysis

The comparison of the performances data was analyzed utilizing SPSS to answer the first research question (compare the performances of clinical nutrition interns before COVID-19 with the performances of the interns during the period of COVID -19) as quantitative data. T-test was used to compare the mean scores between the two groups. A test with a p-value < 0.05 was considered significant.

The interviews was analyzed as qualitative data to answer the second research question (explore the challenges that the clinical nutrition interns faced during the training with COVID-19 in KAH – NGHA, Alahsa). All interviews were transcribed, reviewed, coded and combining codes into themes for presenting themes in a cohesive manner.

Results and Discussion

Objective 1: Measure the impact of COVID-19 on the clinical nutrition interns' performances.

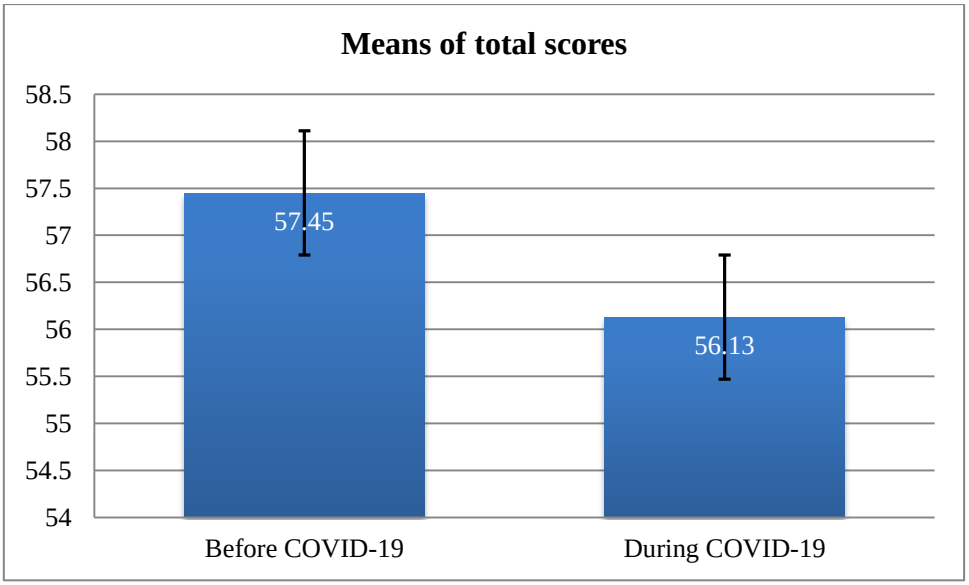
The comparison was done for all the interns in the two groups (20 interns before COVID-19 and 23 interns during COVID-19), F- Test was computed to test the equality of variance for the two groups and followed by Independent t test for this comparison between the groups in three ways: (comparing the total score of the assessment, comparing the three domains scores of the assessment and comparing each point of the assessment), the result was as followed:

1- Comparing the total score of the assessment (a score of 68 considered as full score):

Table (1) Group statistics for the total scores

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
Total Score	before COVID-19	20	57.45	1.761	.394
	during COVID-19	23	56.13	1.058	.221

Table 1 showed that the mean of the total scores before COVID-19 was higher than the mean of the total scores during COVID-19 (57.45 ± 1.761, 56.13 ± 1.058 respectively) graph 1.



Graph (1) deference between the interns' totals scores before and during COVID-19

Table (2) Independent sample test for the total scores

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Total Score	Equal variances	11.910	.001	3.023	41	.004	1.320	.436	.438	2.201

Independent Samples Test										
	assumed									
	Equal variances not assumed			2.923	30.216	.007	1.320	.451	.398	2.241

Table 2 showed that there was a significant difference in the two group variances (0.001 < 0.05), which lead to non-equal variance independent t-test, the p-value was 0.007 < 0.05 which considered significant. Therefore, there was a significant impact of COVID-19 on the interns' performance total score.

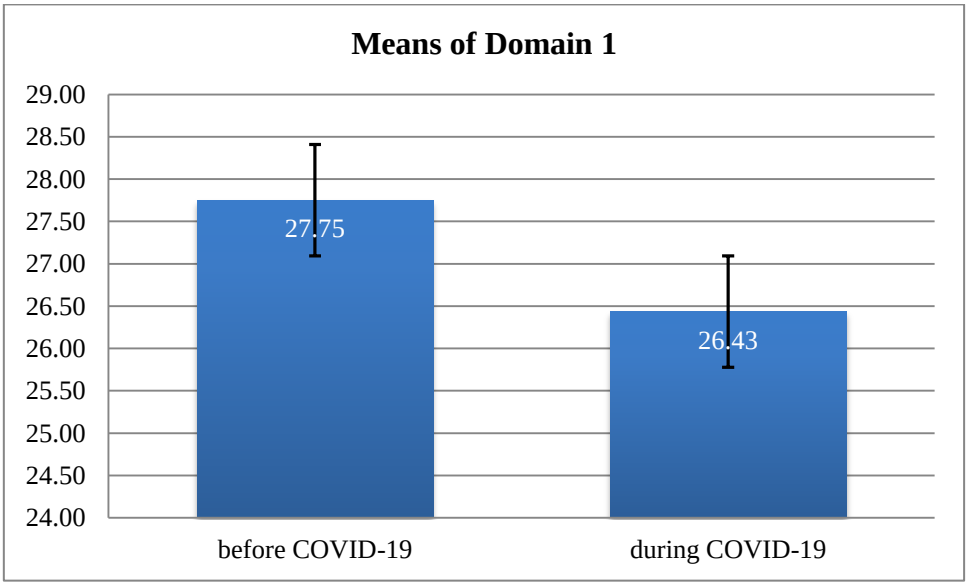
2- Comparing the three domains scores of the assessment (with a maximum score of 32 for Domain1, 16 for Domain 2, and 20 for Domain 3):

Table (3) Group statistics for the three domains

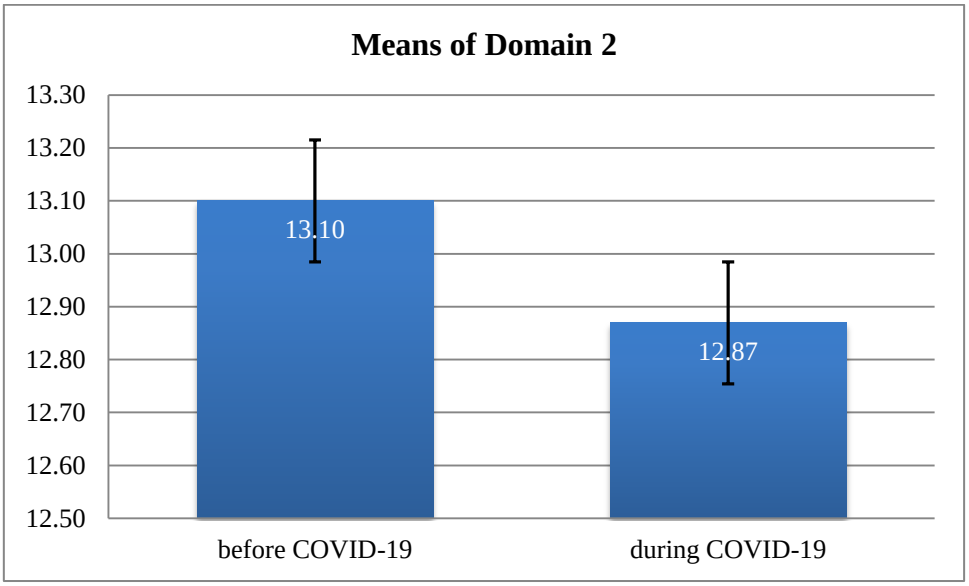
Group Statistics					
Domain	Group	N	Mean	Std. Deviation	Std. Error Mean
1	before COVID-19	20	27.75	.967	.216
	during COVID-19	23	26.43	1.121	.234
2	before COVID-19	20	13.10	.912	.204
	during COVID-19	23	12.87	.757	.158
3	before COVID-19	20	16.60	.598	.134
	during COVID-19	23	16.83	1.029	.215

Table 3 showed the following:

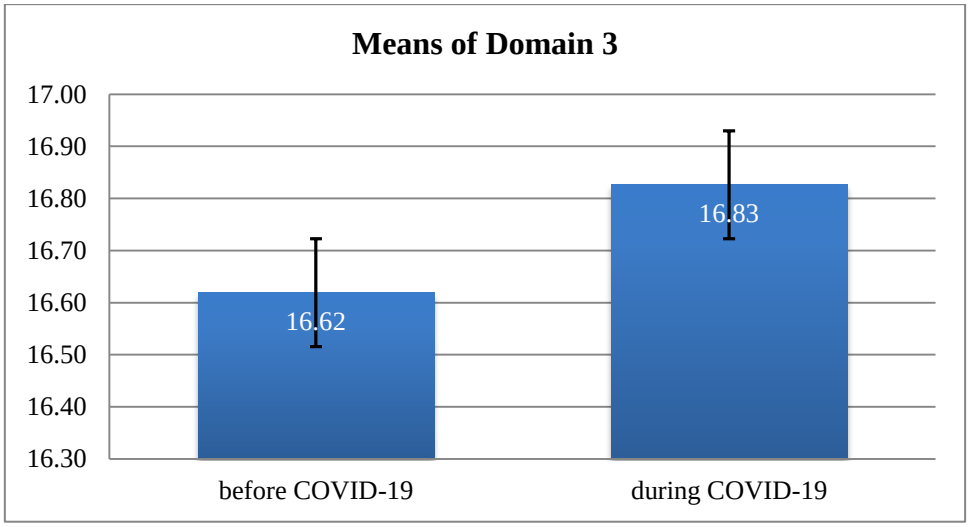
- The means of the scores of Domain 1 before COVID-19 was higher than the means of the scores during COVID-19 (27.75 ± 0.967, 26.43 ± 1.121 respectively)
- The means of the scores of Domain 2 before COVID-19 was higher than the means of the scores during COVID-19 (13.10 ± 0.912, 12.87 ± 0.757 respectively).
- The mean of the scores of Domain 3 before COVID-19 was lower than the means of the scores during COVID-19 (16.60 ± 0.598, 16.83 ± 1.029 respectively) graphs 2, 3 and 4.



Graph (2) deference between the interns' scores in Domain 1 before and during COVID-19



Graph (3) deference between the interns' scores in Domain 2 before and during COVID-19



Graph (4) deference between the interns' scores in Domain 3 before and during COVID-19

Table (4) Independent sample test for the three domains

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Domain 1	Equal variances assumed	.700	.408	4.088	41	.000	1.315	.322	.665	1.965
	Equal variances not assumed			4.131	40.999	.000	1.315	.318	.672	1.958
Domain 2	Equal variances assumed	3.908	.055	.905	41	.371	.230	.255	-.284	.744
	Equal variances not assumed			.894	37.092	.377	.230	.258	-.292	.753
Domain 3	Equal variances assumed	5.055	.030	-.863	41	.393	-.226	.262	-.755	.303
	Equal variances not assumed			-.894	36.106	.377	-.226	.253	-.739	.287

Table 4 showed the following:

- There was no significant difference in the two group variances in Domain 1 (0.408 > 0.05) which lead to equal variance independent t-test, with p-value < 0.001 < 0.05 which considered significant.
- There was no significant difference in the two group variances in Domain 2 (0.055 > 0.05) which lead to equal variance independent t-test, with p-value 0.371 > 0.05 which considered not significant.
- There was a significant difference in the two group variances in Domain 3 (0.03 < 0.05) which lead to non-equal variance independent t-test, with p-value 0.377 > 0.05 which considered not significant.

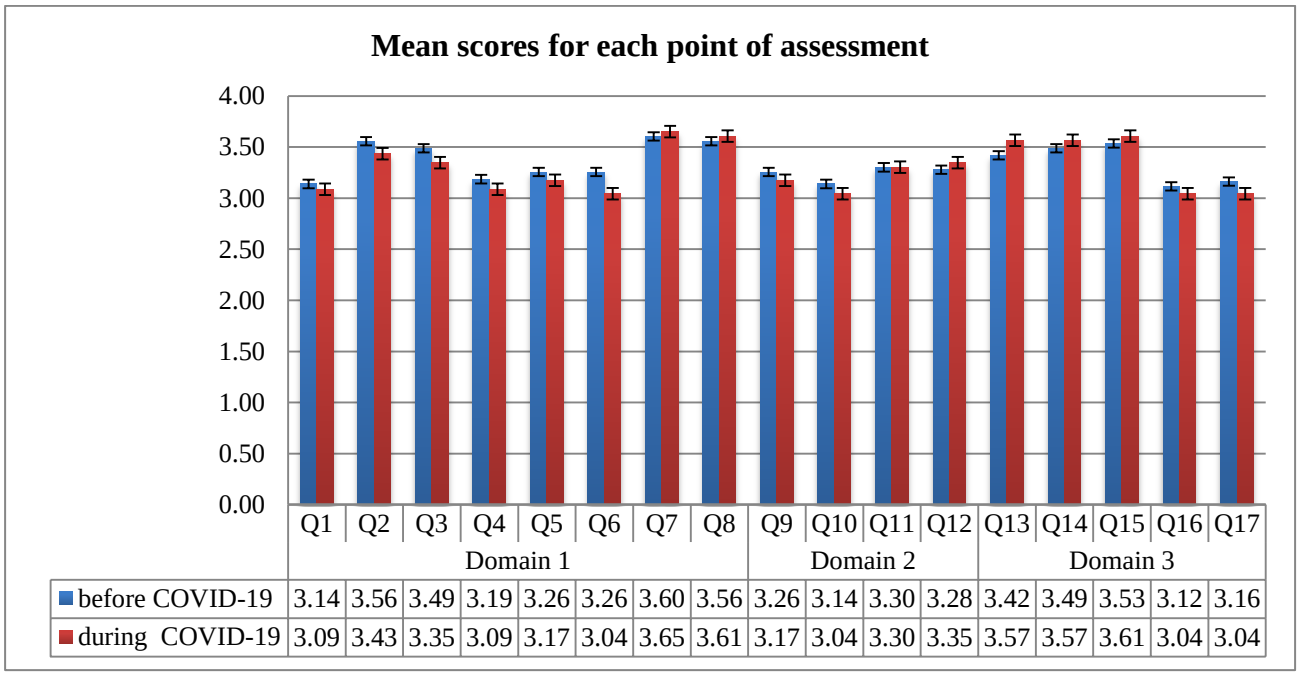
Therefore, there was a significant impact of COVID-19 on the interns' performance in Domain 1 (Knowledge of work and working abilities), while there was no significant impact on their performances in domain 2 (Quality and quantity of work) and Domain 3 (General performance).

3- Comparing each point of the assessment (a score of 4 considered as full score for each point):

Table (5) Group statistics for each point of the assessmen

Group Statistics						
Domain	Assessment point	Group	N	Mean	Std. Deviation	Std. Error Mean
Knowledge of work and working abilities	Q1	before COVID-19	20	3.20	.251	.056
		during COVID-19	23	3.09	.288	.060
	Q2	before COVID-19	20	3.70	.251	.056
		during COVID-19	23	3.43	.507	.106
	Q3	before COVID-19	20	3.65	.286	.064
		during COVID-19	23	3.35	.487	.102
	Q4	before COVID-19	20	3.30	.340	.076
		during COVID-19	23	3.09	.288	.060
	Q5	before COVID-19	20	3.35	.286	.064
		during COVID-19	23	3.17	.388	.081
	Q6	before COVID-19	20	3.50	.324	.073
		during COVID-19	23	3.04	.209	.043
	Q7	before COVID-19	20	3.55	.320	.072
		during COVID-19	23	3.65	.487	.102
	Q8	before COVID-19	20	3.50	.324	.073
		during COVID-19	23	3.61	.499	.104
Quality and quantity Of work	Q9	before COVID-19	20	3.35	.286	.064
		during COVID-19	23	3.17	.388	.081
	Q10	before COVID-19	20	3.25	.303	.068
		during COVID-19	23	3.04	.209	.043
	Q11	before COVID-19	20	3.30	.251	.056
		during COVID-19	23	3.30	.470	.098
	Q12	before COVID-19	20	3.20	.251	.056
		during COVID-19	23	3.35	.487	.102
General performance	Q13	before COVID-19	20	3.25	.444	.099
		during COVID-19	23	3.57	.507	.106
	Q14	before COVID-19	20	3.40	.384	.086
		during COVID-19	23	3.57	.507	.106
	Q15	before COVID-19	20	3.45	.320	.072
		during COVID-19	23	3.61	.499	.104
	Q16	before COVID-19	20	3.20	.251	.056
		during COVID-19	23	3.04	.209	.043
	Q17	before COVID-19	20	3.30	.251	.056
		during COVID-19	23	3.04	.209	.043

Table 5 showed that the means of scores were higher before COVID-19 than during COVID-19 in 10 points of assessments, lower in other 6 points and both groups had equal mean score in one point (Graph 5).



Graph (5) deference between the interns' mean scores in each point of their performance assessment before and daring COVID-19.

Table (6) Independent sample test for each point of the assessment

Independent Samples Test											
Domain			Levene's Test for Equality of Variances		t-test for Equality of Means						
			F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
										Lower	Upper
Knowledge of work and working abilities	Q1	Equal variances assumed	2.235	.143	1.361	41	.181	.113	.083	-.055	.281
		Equal variances not assumed			1.374	40.998	.177	.113	.082	-.053	.279
	Q2	Equal variances assumed	192.432	.000	2.122	41	.040	.265	.125	.013	.518
		Equal variances not assumed			2.216	33.131	.034	.265	.120	.022	.509
	Q3	Equal variances assumed	22.937	.000	2.433	41	.019	.302	.124	.051	.553
		Equal variances not			2.519	36.276	.016	.302	.120	.059	.545

Independent Samples Test											
		assumed									
	Q4	Equal variances assumed	5.313	.026	2.224	41	.032	.213	.096	.020	.407
		Equal variances not assumed			2.198	37.489	.034	.213	.097	.017	.409
	Q5	Equal variances assumed	.448	.507	1.674	41	.102	.176	.105	-.036	.389
		Equal variances not assumed			1.710	39.998	.095	.176	.103	-.032	.384
	Q6	Equal variances assumed	2.997	.091	5.560	41	.000	.457	.082	.291	.622
		Equal variances not assumed			5.398	31.581	.000	.457	.085	.284	.629
	Q7	Equal variances assumed	16.145	.000	-.799	41	.429	-.102	.128	-.360	.156
		Equal variances not assumed			-.822	38.349	.416	-.102	.124	-.354	.149
	Q8	Equal variances assumed	22.963	.000	-.832	41	.410	-.109	.131	-.372	.155
		Equal variances not assumed			-.857	38.150	.397	-.109	.127	-.365	.148
(2) Quality and quantity of Work	Q9	Equal variances assumed	.448	.507	1.674	41	.102	.176	.105	-.036	.389
		Equal variances not assumed			1.710	39.998	.095	.176	.103	-.032	.384
	Q10	Equal variances assumed	15.595	.000	2.629	41	.012	.207	.079	.048	.365
		Equal variances not assumed			2.562	32.998	.015	.207	.081	.043	.370
	Q11	Equal variances assumed	18.597	.000	-.037	41	.971	-.004	.118	-.242	.233
		Equal variances not assumed			-.038	34.505	.970	-.004	.113	-.234	.225
	Q12	Equal variances assumed	37.697	.000	-1.222	41	.229	-.148	.121	-.392	.096
		Equal variances not assumed			-1.274	33.862	.211	-.148	.116	-.384	.088
perform	Q13	Equal variances assumed	5.758	.021	-2.153	41	.037	-.315	.146	-.611	-.020

Independent Samples Test											
		Equal variances not assumed			-2.173	40.995	.036	-.315	.145	-.608	-.022
	Q14	Equal variances assumed	15.209	.000	-1.190	41	.241	-.165	.139	-.446	.115
		Equal variances not assumed			-1.213	40.295	.232	-.165	.136	-.440	.110
	Q15	Equal variances assumed	23.165	.000	-1.219	41	.230	-.159	.130	-.422	.104
		Equal variances not assumed			-1.256	37.931	.217	-.159	.126	-.414	.097
	Q16	Equal variances assumed	12.760	.001	2.232	41	.031	.157	.070	.015	.298
		Equal variances not assumed			2.203	37.080	.034	.157	.071	.013	.300
	Q17	Equal variances assumed	12.760	.001	3.658	41	.001	.257	.070	.115	.398
		Equal variances not assumed			3.610	37.080	.001	.257	.071	.113	.400

Table 6 showed that there was a significant difference in the two group variances (< 0.05) in 13 points mean scores (Q 2, 3, 4, 7, 8, 10, 11, 12, 13, 14, 15, 16 and 17) which lead to non-equal variance independent t-test. The results as well showed that there was no significant difference in the two group variances (> 0.05) in 4 points mean scores (Q 1, 5, 6 and 9) which lead to equal variance independent t-test.

The p-value was < 0.05 in 7 points of the assessment out of 17 points (Q3, 4, 6, 10, 13, 16 and 17) which considered significant which means a significant impact of COVID-19 has been occurred to the interns' performances in these specific points, while it was > 0.05 in the other 10 points lead to no significant difference in these points mean scores which considered not significant. Table 7 showed the group with higher mean scores in each point of the assessment and the significance of differences between the two groups:

Table (7) Summary of the differences and p-value of each point of the assessment

Domain	Point of assessment	The higher mean score	The significance of differences (p value < 0.05)
Domain 1	Q1	before COVID-19	No
	Q2	before COVID-19	No
	Q3	before COVID-19	Yes
	Q4	before COVID-19	Yes
	Q5	before COVID-19	No

Domain	Point of assessment	The higher mean score	The significance of differences (p value < 0.05)
	Q6	before COVID-19	Yes
	Q7	during COVID-19	No
	Q8	during COVID-19	No
Domain 2	Q9	before COVID-19	No
	Q10	before COVID-19	Yes
	Q11	Equal	No
	Q12	during COVID-19	No
Domain 3	Q13	during COVID-19	Yes
	Q14	during COVID-19	No
	Q15	during COVID-19	No
	Q16	before COVID-19	Yes
	Q17	before COVID-19	Yes

Objective 2: Identify the challenges that were experienced by the interns during COVID-19.

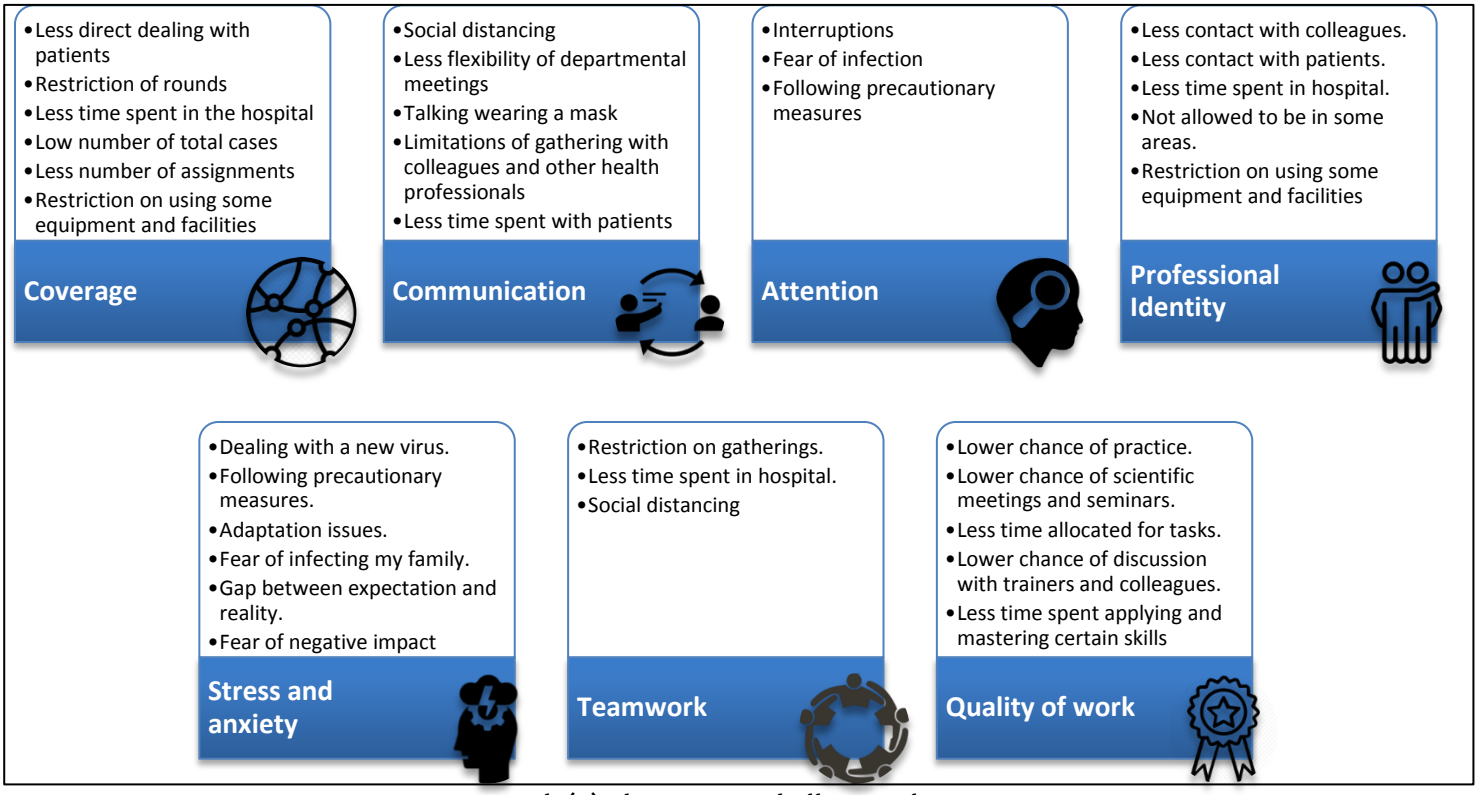
All the 23 interns who have the training during COVID-19 were called for one to one interview, 22 have responded with the rate of 96 percent.

The one to one interviews were conducted, and the data was prepared, organized, transcribed and reviewed by the research team. Coding then took place by labeling and organizing our data to categorize all emerged themes and understand the relationship between them (Graph 30). The themes and its related codes were categorized as following:

- **Coverage:** the training had low coverage in several point in order to follow the precautionary measures, these points are:
  - Less direct dealing with patients.
  - Restriction of rounds.
  - Less time spent in the hospital.
  - Low number of total cases.
  - Less number of assignments.
  - Restriction on using some equipment and facilities.
- **Communication:** the training communication was effected by the precautionary measures and caused a number of issues including:
  - Social distancing.
  - Less flexibility of departmental meetings.
  - Talking wearing a mask.
  - Limitations of gathering with colleagues and other health professionals.
  - Less time spent with patients.

- **Attention:** the interns attentions were effected during the training due to:
  - Interruptions.
  - Fear of infection.
  - Following precautionary measures.
- **Professional Identity:** the interns feelings of affiliation and personal identity were affected due to:
  - Less contact with colleagues.
  - Less contact with patients.
  - Less time spent in hospital.
  - Not allowed to be in some areas.
  - Restriction on using some equipment and facilities.
- **Stress and anxiety:** working during this period had to caused several stress and anxiety symptoms, and these symptoms were occurred due to:
  - Dealing with a new virus.
  - Following precautionary measures.
  - Adaptation issues.
  - Fear of infecting my family.
  - Gap between expectation and reality.
  - Fear of negative impact on future career.
- **Teamwork:** there was a several points that effected the teamwork during the training including:
  - Restriction on gatherings.
  - Less time spent in hospital.
  - Social distancing.
- **Quality of work:** there were deferent reasons behind the low performances quality including:
  - Lower chance of practice.
  - Lower chance of scientific meetings and seminars.
  - Less time allocated for each task.
  - Lower chance of discussion with senior trainers and colleagues.
  - Less time spent applying and mastering certain skills (communications, presentation, equipment etc.).

These generated themes are considered barriers to achieve higher performances and therefore support and explain why the performance of interns during COVID-19 had been affected compared to the interns who completed their internship the year before.



Graph (6) The training challenges themes

Recommendations:

The results of can be concluded according to our objectives of the study as following:

Objective 1: Measure the impact of COVID-19 on the clinical nutrition interns' performances.

Our findings showed that COVID-19 had a significant impact on the clinical nutrition interns' performances particularly in Domain 1 (Knowledge of work and working abilities), while it was not significant on domain 2 (Quality and quantity of work) and Domain 3 (General performance).

COVID-19 had also impacted the significantly impacted the clinical nutrition interns' performances points including: adjusting to new work methods and conditions, work planning and organizing, accept the maximum responsibilities for new assignments. Thoroughness and completeness work, the ability of executing the responsibilities and over-all performance.

Objective 2: Identify the challenges that were experienced by the interns during COVID-19.

The one to one interviews were also conducted, and the data was prepared, organized, transcribed and reviewed by the research team. Coding then took place by labeling and organizing our data to categorize all emerged themes and understand the relationship between them. Coverage, communication, attention, professional identity, stress and anxiety, teamwork and quality of work were the main themes that can explain the reasons behind the difference in interns' performance before and during COVID-19.

According to the founded results, we recommend the following:

- Increase the training hours in the hospital.
- Increase the practical training and lowering theoretical training.
- Facilitate the communication with the patients and other health professionals with lowering the physical contact.
- Conduct more scientific meetings, workshops and seminars with the interns.
- Provide more assignments and case scenarios for the interns to be done at home.
- Provide additional courses for the interns to enhance their abilities in communication skills, stress management, time management and professionalism.

Limitations

Some limitation in this project should be noted. First, the small sample size of the study may affect the variety and the reliability and may undermine the internal and external validity of this study (19-21). Second, the sample selected for this study was specifically interns in clinical nutrition who were pursuing a health profession carrier, and as a result, are identified as health science interns. The result obtained in this study may not be applicable for interns outside of this designation. Further research with larger sample size is recommended.

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