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Evaluation of nurses' learning in an online course about venous leg ulcer

Avaliação da aprendizagem de enfermeiros em um curso online sobre úlcera venosa

Evaluación del aprendizaje de enfermeros en un curso online sobre úlcera venosa

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ABSTRACT

Objective: To evaluate the degree of knowledge of nurses about venous leg ulcer (VLU) and compressive therapy (CT); comparing the degree of knowledge on the subject between nurses with and without specialized training in stomatherapy, after the online course; and analyze the demographic and educational variables associated with learning. **Methods:** A quasi-experimental and comparative study in which a didactic intervention was tested in two different groups of nurses, through the application of a questionnaire to evaluate learning before and after the course. Data were analyzed by McNemar, chi-square, F of ANOVA tests, Student t and generalized estimation equations. **Results:** The specialist nurses obtained average scores of 7.79 and 9.07 and the generalists of 6.39 and 8.49, respectively, in the pre and post-course. Age equal or higher to 30 years influenced to the highest degree of knowledge after the course. **Conclusion:** The course allowed learning about the theme in both groups. Specialist nurses had greater knowledge on the subject when compared to generalist nurses.

DESCRIPTORS: Stomatherapy; Varicose ulcer; Compressive bandages; Computing in nursing; Correspondence course; Learning; Stomatherapy.

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RESUMO

Objetivo: Avaliar o grau de conhecimento de enfermeiros sobre úlcera venosa (UV) e terapia compressiva (TC); comparar o grau de conhecimento sobre a temática entre enfermeiros com e sem formação especializada em estomaterapia, após a realização de curso *online*; e analisar as variáveis demográficas e educacionais associadas à aprendizagem. **Métodos:** Estudo quase experimental e comparativo em que se testou uma intervenção didática em dois grupos distintos de enfermeiros, por meio da aplicação de questionário para avaliação da aprendizagem antes e após o curso. Os dados foram analisados por testes McNemar, qui-quadrado, F da ANOVA, *t* de Student e equações de estimação generalizada. **Resultados:** Os enfermeiros especialistas obtiveram notas médias 7,79 e 9,07 e os generalistas 6,39 e 8,49, respectivamente, nos pré- e pós-curso. A idade igual ou superior a 30 anos influenciou para o maior grau de conhecimento após o curso. **Conclusão:** O curso permitiu a aprendizagem sobre a temática em ambos os grupos. Enfermeiros especializandos tinham maior conhecimento sobre o tema quando comparados aos enfermeiros generalistas.

DESCRITORES: Estomaterapia; Úlcera varicosa; Bandagens compressivas; Informática em enfermagem; Educação a distância; Aprendizagem; Estomaterapia.

RESUMEN

Objetivo: Evaluar el grado de conocimiento de enfermeros sobre úlcera venosa (UV) y terapia compresiva (TC); comparar el grado de conocimiento sobre la temática entre enfermeros con y sin formación especializada en estomaterapia, después de la realización del curso online; y analizar las variables demográficas y educativas asociadas al aprendizaje. **Métodos:** Estudio cuasi experimental y comparativo en el que se probó una intervención didáctica en dos grupos distintos de enfermeros, por medio de la aplicación de un cuestionario para evaluación del aprendizaje antes y después del curso. Los datos fueron analizados por pruebas McNemar, x-cuadrado, F de ANOVA, *t* de Student y ecuaciones de estimación generalizada. **Resultados:** Los enfermeros especializados obtuvieron notas promedios 7,79 y 9,07 y los clínicos 6,39 y 8,49, respectivamente, en los pre y post curso. La edad igual o superior a 30 años influyó para un mayor grado de conocimiento después del curso. **Conclusión:** El curso permitió el aprendizaje sobre la temática en ambos grupos. Enfermeros especializados tenían mayor conocimiento sobre el tema en comparación con los enfermeros clínicos.

PALABRAS CLAVE: Estomaterapia; Úlcera varicosa; Vendajes compresivos; Informática en enfermería; Educación a distancia; Aprendizaje; Estomaterapia.

INTRODUCTION

In the era of knowledge, the speed of innovations, coupled with the labour market's demand for more and more skilled professionals, make the man stimulated to perform constant updates of its knowledge. Online teaching meets this reality and it is an alternative tool for training nurses[1-5].

Organizations have used online education to develop strategies for the continuous updating of organizational and individual competencies since they enable a greater reach of people than in face-to-face courses[6]. Faced with the technological evolution and the requirements of permanent professional updating, nursing education cannot do without new technologies for professional training.

The use of online teaching can be an effective strategy in the learning-teaching process, but the development of this tool requires, in addition to the interactive and dynamic pedagogical perspective, a well-planned interface that is intuitive to the user[7].

The andragogy has been adopted as a successful educational pathway for online training of nursing professionals, for understanding and promoting adult learning, based on training in the experience it brings in their life history, whether it is a formal or informal formation[8]. The andragogic model is based on the presuppositions of the necessity for knowledge, readiness to learn, experiences lived by the learners throughout life (adults accumulate more experiences compared to young people), orientation for learning and motivation. The adult needs to know why to learn a new subject, to correlate and reflect on their past experiences and to understand how to apply them in future situations with excellence, quality and efficiency. In this way, it feels motivated to realize that new learning can help in the execution of activities or coping with problems[9]. In this perspective, the andragogic model and the permanent education in nursing can be used in educational proposals online in nursing, aiming at the professional qualification and training[10].

For stomatherapy, as an eminently clinical speciality that involves the care areas for people with stomas, wounds and incontinences, online teaching based on the best scientific evidence has proven to be an effective strategy for updating and qualifying nursing professionals, for the quality of health care[2,11,12].

In stomatherapy and dermatology nursing, as well as in public health, venous ulcers (VUs) are a serious problem, with prevalences varying from 0.18-5.69% and higher incidences in the elderly over 65 years, compromising productivity and the quality of life of people and families, as well as costly expenses with health. In addition to adequate diagnosis and treatment are fundamental for care, one of the most important preventive and therapeutic measures is compressive therapy (CT), in which patients can achieve complete healing in 40 to 95% of cases. CT is the application of pressure to the lower extremities of the legs as a means of facilitating the venous return to the heart and can be performed with the use of compression elastic stockings, compression bandages and intermittent pneumatic compression[13,14].

In daily clinical practice, the difficulties encountered by most nurses regarding the indication, application and handling of the different compression systems motivated the development of the specific course on VU and CT by nurses of the XVII Specialization Course in Stomatherapy Nursing School of Nursing at the University of São Paulo (EEUSP) in 2009. The course was validated by specialists in stomatherapy and in correspondence course[2].

The objectives of this study were to evaluate the degree of nurses' knowledge about VU and CT; comparing the degree of knowledge on the subject between nurses with and without specialized training in stomatherapy after taking an online course; and analyze the demographic and educational variables associated with learning.

METHODS

This is a quasi-experimental and comparative study in which a didactic intervention was tested in two different groups of nurses. It was realized after approval by the Research Ethics Committee (Protocol 1062/2011/ CEP-SISNEP CAAE: 0068.0.196.000-11).

The study sample consisted of 57 nurses distributed in two groups: Group A, composed of 28 nurses who attended specialization in nursing in stomatherapy at EEUSP in 2011 and 2013; and Group B, composed of 29 general nurses who worked in eight general hospitals of medium and large size in the city of São Paulo in 2013. It should be noted that the sampling was non-probabilistic for convenience, and no sample calculation was performed.

Group A nurses were invited to participate in the study while attending a stomatherapy specialization, and all components of both specialization courses (offered biennially) accepted to participate in the study. The selection of Group B nurses was done through an invitation letter sent electronically to the coordinators of the continuing education services of eight general hospitals in the city of São Paulo, which included the research objectives and the inclusion criteria for the group composition: no have specialized training in stomatherapy and/or dermatology and do not participate in commissions or groups of treatment of wounds in the institutions of work. In this way, the list of interested parties was sent by the directors of the continuing education services, and it is up to the researchers to confirm compliance with the inclusion criteria. All the nurses who composed the sample of the present study accepted to participate voluntarily and knew that the course was free and that it would include two attendances in person (at the beginning and end of the course). All participants from both groups signed the Free and Informed Consent Term (FICT) in two ways.

The participants of Group A were guided by the researchers with regard to the online course, the navigation in the Moodle platform and the research procedures during the last month of the period of the theoretical classes of each edition of the Specialization Course in Stomatherapy (in 2011 and 2013) - after the theoretical module of care for patients with acute and chronic wounds - in a face-to-face meeting held at the Informatics Laboratory of EEUSP. At that time, the students signed the FICT and answered the pre-course evaluation questionnaire (pre-test). The nurses from Group B also participated in a face-to-face meeting at the same site, received the same instructions from the researchers, signed the FICT and completed the questionnaire in 2013, in a different period of the

nurses from Group A. All the nurses who composed the sample of this research accessed the content of the online course and realized the electronic activities planned for a maximum period of 30 days (from the face-to-face meeting), at times and places of their own choice. In addition, they participated in a second meeting held at EEUSP, to complete the post-course evaluation (post-test) questionnaire, on a pre-scheduled date for each group and after the end of the 30-day online course activities. Each face-to-face meeting (pre and post-course) lasted approximately 1 1/2 hours.

The online course on VU and CT was available on the Moodle platform at the electronic address http://www.moodle.redealuno.usp.br, to which the participants had access after electronic authorization of the tutors by means of a registration made with name user name and password. The course contains 10 modules[2]: anatomy and physiology of the venous system, chronic venous insufficiency, VU, VU patient evaluation, VU prevention and treatment, CT introduction, bandages, elastic stockings, pneumatic compression and clinical case study. All modules have: supporting texts and slides based on the main bibliographic references on the subject; complementary literature with scientific articles, consensuses, Cochrane reviews and links to the main sites and guidelines; and illustrations and videos illustrating content. At the end of each module, the nurses performed formative evaluations and filled in the glossary with learned terminologies. The estimated average time for the participant to complete all course modules was 20 hours, with 2 hours for each module.

The nurses from both groups were accompanied by eight tutors who divided themselves in order to offer continuous support to the participants, to answer their doubts and to stimulate their involvement with the course and their own learning. The tutorial was synchronous and asynchronous, in which the tutors responded to the doubts posted in the forums and in chat. At the end of the course, the discussion of the case study was realized via chat, aiming at the interaction, the development of the critical sense and the collaboration among nurses. The files were sent for evaluation and obtaining the final grade of the course.

For data collection, two instruments were used. The first one allowed the profile of the participants to be surveyed, including age, gender, year of graduation, specialization in stomatherapy, area of action and participation in refresher courses related to wounds in the last 5 years. The second instrument - questionnaire to evaluate knowledge on the subject - contained 10 multiple choice questions and aimed at assessing nurses' knowledge about VU and CT (anatomy, pathophysiology, epidemiology, prevention, diagnosis and treatment). The questionnaire score was distributed: multiple choice questions with one point and each correct sentence of questions of the true or false type with a value of 0.25, totalling one point per question. The total value of the test was 10 points. The total period for intervention and data collection was 31 days for both groups, with 2 days for the face-to-face meetings (in which the pre and post-course data collection instruments were applied) and 30 days for access to the online course and development of activities by the participants.

The data obtained were inserted in a specific database, using the Microsoft Excel® program, and then double checked for greater security and error prevention. It was considered the degree of knowledge as a dependent variable and the previous formation, the area of action, the age and the time of formation as independent variables. The analysis of the data was initiated by testing the evolution in the correct answers, question by question, by the McNemar test. The comparison of the correct answers between groups (A and B) was performed by the chi-square test. In order to model the evolution of the score according to explanatory variables, the means of the scores were first compared to the F test of ANOVA (3 or more factors) or Student t-test (2 factors). Finally, a marginal model was fitted using generalized estimation equations (GEE). For the analyses, a significance level of 5% was used, and the results were obtained with the aid of statistical software R-2 15.3.®[15].

RESULTS

The total sample consisted predominantly of women (only two men), aged between 22 and 53 years, being homogeneously distributed among the groups in terms of age groups. Approximately 88% of the nurses worked in the care of medical and surgical clinics, outpatient clinics, intensive care units and emergency rooms; 30 nurses (52.6%) graduated between 2007 and 2012; 21 (36.8%)

between 2000 and 2006 and only six (10.5%) graduated before 1999. Thirty-seven (67.3%) had specialization in other areas and 35 (62.5%) performed some course related to wounds in the last 5 years.

Figure 1 shows that the nurses in Group B have less knowledge and previous knowledge on the subject compared to those in Group A, since the highest grade presented by the first ones, before the course, practically equals the lowest grade presented by Group A at the same time. However, after the course, both groups obtained higher means, meaning knowledge gain. The means of groups A and B were 7.6 and 6.3 before course, respectively, and 9.0 and 8.5 after course, respectively. It is also verified that Group A obtained about 1.5 more in the final average compared to the initial average, while Group B obtained around two points more.

Table 1 shows that there was an increase in hits for all questions in the total sample. However, only for the items anatomy and vascular physiology (questions 1 and 2), differences between VU and arterial ulcer (AU) (question 5), skin care for VU prevention (question 6a), CT and ankle-arm (AAI) (question 9) and types of bandages (question 10), the differences were statistically significant ($p < 0.05$). All nurses achieved 100% accuracy in questions on prevalence (question 3b), assessment - including AAI (question 8d) - characteristics of VU (question 4a) and prevention of VU (question 6b). The questions on anatomy and venous physiology (question 2), an indication of elastic stockings (questions 8a and 8b), a definition of AU (questions 5c and 5d) and AAI (question 9) presented lower hit rates compared to the other questions. Concerning previous complementary training on wounds, it was verified that 24 (88.9%) Group A nurses performed at least one course in the last 5 years, which happened to only 11 (37.9%) nurses of the Group B.

It is also observed that nurses with up to 29 years old increased the grade by 1.89; those aged 30 to 39 raised the grade at 3.02 and those aged 40 and older raised the grade by up to 3.74.

When the existence of interactions between the age groups and the specific knowledge (initial marginal model estimated by GEE) was verified, the correlations were tested among the variables: age group, group and moment, before and after the course, that is, variations of age and specific knowledge, independently. Table 2 shows the estimates of the final marginal model without the non-significant components of the initial model.

The increase in the level of knowledge among nurses aged between 30 and 39 years ($p = 0.028$) or 40 years or more ($p = 0.043$) is about 0.86 higher than the gain obtained by those aged up to 29 years. The evolution of knowledge for Group A is 0.786 ($p = 0.022$), lower than the evolution of those belonging to Group B.

When multiple comparisons were made between groups and ages before and after the course, regardless of prior knowledge, the mean scores obtained in Group A at both times were significantly higher than those achieved in Group B, as shown in Table 3.

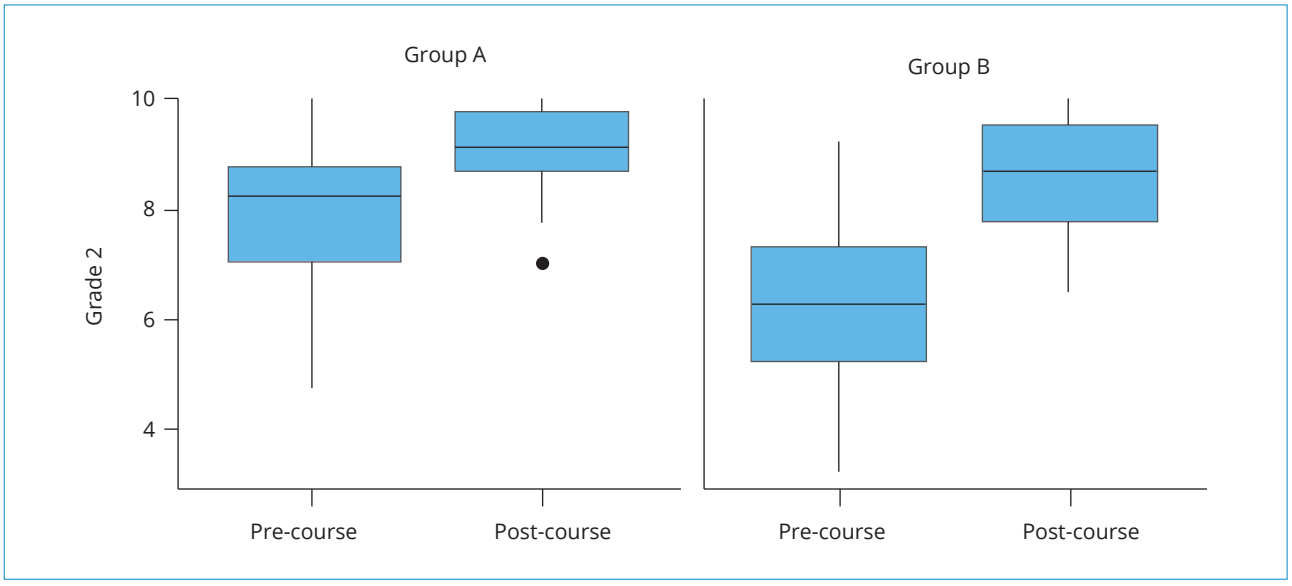

Figure 1. Averages of the grades of groups A and B according to the moment (pre and post-course). Sao Paulo/SP, 2014.

Table 1. The frequency of correct answers by pre and post-course question. São Paulo / SP, 2014.

Question	Set before	Set after	Error before, set after	Set before, error after	p-value*
	n (%)	n (%)	n (%)	n (%)	
1 (Anatomy)	29 (50.8)	52 (91.2)	23 (40.4)	-	< 0.001
2 (Anatomy and Physiology)	18 (31.6)	42 (73.7)	30 (52.6)	6 (10.5)	< 0.001
3a (Definition of VU)	51 (89.4)	56 (98.2)	5 (8.8)	-	0.074
3b (Prevalence)	55 (96.5)	57 (100.0)	2 (3.5)	-	0.48
3c (Pathophysiology of VU)	51 (89.5)	56 (98.2)	6 (10.5)	1.8	0.131
3d (Pathophysiology of VU)	49 (85.9)	54 (94.7)	7 (12.3)	2 (3.5)	0.182
4a (VU Characteristics)	55 (96.5)	57 (100.0)	2 (3.5)	-	0.48
4b (VU Characteristics)	54 (94.7)	55 (96.5)	3 (5.3)	2 (3.5)	1.00
4c (VU Characteristics)	50 (87.7)	52 (91.2)	6 (10.5)	4 (7.0)	0.752
4d (VU Characteristics)	51 (89.4)	53 (92.9)	5 (8.8)	3 (5.3)	0.724
5a (AU Characteristics)	43 (75.4)	53 (93.0)	12 (21.1)	2 (3.5)	0.016
5b (VU Characteristics)	50 (87.7)	55 (96.4)	6 (10.5)	1 (1.8)	0.131
5c (AU Characteristics)	41 (71.9)	45 (78.9)	9 (15.8)	5 (8.8)	0.423
5d (VU/AU Characteristics)	52 (91.2)	51 (89.4)	4 (7.0)	5 (8.8)	1.00
6a (VU Prevention)	33 (57.9)	50 (87.7)	18 (31.6)	1 (1.8)	< 0.001
6b (VU Prevention)	57 (100.0)	57 (100.0)	-	-	-
6c (VU Prevention)	50 (87.7)	49 (86.0)	5 (8.8)	6 (10.5)	1.00
6d (VU Prevention)	52 (91.2)	56 (98.2)	4 (7.0)	-	0.134
7 (CT and covers)	50 (87.7)	51 (89.5)	5 (8.8)	4 (7.0)	1.00
8a (Elastic Stockings)	39 (68.4)	46 (80.7)	13 (22.8)	6 (10.5)	0.169
8b (Elastic Stockings)	25 (43.9)	32 (56.2)	13 (22.8)	6 (10.5)	0.169
8c (Evaluation of VU-AAI)	44 (77.2)	52 (91.2)	11 (19.3)	3 (5.3)	0.061
8d (Evaluation of VU-AAI)	53 (93.0)	57 (100.0)	4 (7.0)	-	0.134
9 (AAI and CT)	20 (35.1)	37 (64.9)	24 (42.1)	7 (12.3)	0.004
10 (CT and bandages)	44 (77.1)	56 (98.2)	12 (21.1)	-	0.001

*McNemar Test. AAI = ankle-arm index; CT = compressive therapy; AU = arterial ulcer; VU = venous ulcer.

Table 2. Estimated parameters for the final marginal model. Sao Paulo/SP, 2014.

Coefficients	Estimate	Standard error	p-value
Intercept	7.238	0.272	< 0.001
Age (30-39)	-1.207	0.327	< 0.001
Age (40 or more)	-2.034	0.458	< 0.001
Specific knowledge (Group A)	1.376	0.305	< 0.001
Time (post-course)	1.596	0.336	< 0.001
Age (30-39) - Time (post-course)	0.870	0.395	0.028
Age (40 or more) - Time (post-course)	0.856	0.423	0.043
Specific knowledge (Group A) - Time (post-course)	-0.786	0.342	0.022
Scale parameter	1.195	0.174	< 0.001
Correlation parameter (pre-post)	0.284	0.105	0.007

Table 3. Multiple comparisons based on the final marginal model. Sao Paulo/SP, 2014.

Multiple comparisons	Estimate	Standard error	p-value
Before the course			
Age 20 to 29 versus 30 to 39 years	1.207	0.327	< 0.001
Age 20 to 29 versus 40 years ou mais	2.034	0.458	< 0.001
Age30 a 39 versus 40 years ou mais	0.827	0.413	0.045
Group A versus Group B	1.376	0.305	< 0.001
After the course			
Age 20 to 29 versus 30 to 39 years	0.337	0.335	0.314
Age 20 to 29 versus 40 years or more	1.179	0.419	0.005
Age 30 to 39 versus 40 years or more	0.841	0.413	0.042
Group A versus Group B	0.590	0.301	0.050

DISCUSSION

The relevance of an online course on the care of people with VUs focused on CT can be considered in the sense of adding specific knowledge to nursing professionals in a flexible and innovative way, through educational technologies. Online correspondence course has characteristics that allow flexibility of schedules and physical displacements that facilitate the training of nurses. Certainly, knowledge on the subject allows professionals to act in the prevention and treatment of VU, as an action of evidence-based care, the essence of nursing care. In this sense, for the successful learning of health professionals, it is important to use innovative strategies-such as the online course on VU - suitable for content and goals that allow the development of skills and incorporation of values[16].

The online course on VU allowed the learning about nursing interventions and contributed to the deepening of the theoretical bases that base actions and decisions through clinical reasoning. In this sense, online courses stimulate self-confidence and the sharing of experiences, as well as promote the environment of mutual respect and structured and individualized learning[16].

Another factor to consider is the search for the course. The interest of the generalist nurses for the theme motivated them to seek improvement when the invitation to hospital professionals was made. In this way, it reinforces the necessity to address issues that meet the desires of those who wish to learn, thus arousing interest, motivation and elucidation of doubts.

The results of this study showed that, after completing the online course with a Focus on Compressive Therapy, there was a growing awareness of all the nurses in the sample. A significant increase in the grade (degree of knowledge) was observed for those aged 30 years or more, with greater relevance for those aged 40 years or more.

Analyzing the influence of age on the nurses' performance, that is, in the evaluation of the degree of knowledge obtained after the course Venous Ulcer with a Focus on Compressive Therapy, it was verified that in both groups, the lower the age, the greater the average grade after the course. However, although the younger participants presented higher means, participants who were 40 years of age or more had better achievement in the course, that is, the group that increased the average in relation to the level of knowledge after the course. According to the andragogic model, the lived experiences help in the process of learning is that adults learn more in the context of real life, being motivated to learn to solve problems[10, 17]. As people mature, they become independent, accumulate life experiences that justify their learning, direct their interests to the development of skills, wait for the practical application of what they learn and learn to solve problems and challenges[10].

The results show, therefore, the relation between the age and the performance of the participants of online courses and point to the necessity to adopt specific teaching strategies for each stage of life. Nursing students with a higher degree of autonomy can present better performance, and learning occurs due to the degree of responsibility that is assumed in relation to the activities. Research shows that online education favours the student's awareness of the performance of the emergency response and allows access to knowledge, acting as a space for knowledge and a reflection environment, stimulating clinical reasoning and decision making in nursing[18].

There is a range of studies that evidence the existence of predictive characteristics of better performance in distance courses related to age, previous experiences, interaction, self-control, discipline and communication capacity[19]. Although not included in the objectives of the study, it is important to mention that the nurses of both groups evaluated the didactic material and the tutorial of the online course as adequate strategies to reach their objectives, that is, the improvement of the degree of knowledge. The tutors of the online course have assumed the role of mediators of learning, which is in agreement with the literature, since the tutor must motivate and arouse the interest of the participants, considering the context in which the learning will be applied and how each will be tutored[20].

The challenges of online teaching are not only instrumental, but also the posture that the educational environment should have in front of technological innovations as an efficient and liberator pedagogical component so that they do not only become replicators

of information but also means of socializing knowledge and field of practices promoting new educational possibilities mediated, to contribute to the formation of critical and creative individuals[21].

The limitations of this study refer to the process of non-probabilistic sampling of convenience and to the absence of a control group that, although difficult to generalize, allows to obtain a good image of the studied universe and to indicate that there is a relation between demographic and educational variables associated to learning in online courses. However, contributions are emphasized because it is an intervention study, so necessary for the expansion of the body of evidence in nursing. In addition, it employs and analyzes a modern educational tool based on andragogy, whose use should be expanded, maximized and optimized, especially when considering professional lacks in the area of caring for people with wounds in a country of continental dimension and remote areas, as is Brazil.

It is pertinent to deepen and expand knowledge in this area through experimental research, to enable the analysis of causal relationships between variables, as well as the evaluation of face-to-face or online courses and the impact on health care.

CONCLUSION

The favourable results obtained in the present evaluation study of the online course on VU and CT, together with nurses with and without specialized training, allow their dissemination and implementation to be recommended for nursing and multidisciplinary teams in different healthcare settings, provided tha.t content and educational objectives are tailored to the target audience.

The results of the study confirm that there was an acquisition of knowledge about VU and CT between nurses with and without specialized training in stomatherapy and that the specialized nurses of this sample have greater knowledge regarding the subject when compared to non-specialized nurses, especially at the pre-course online.

AUTHORS CONTRIBUTION

Conceptualization: Schmidt FMQ, Aroldi JB, Peres HHC, Quiroz LM, dos Anjos PP, Teixeira VA, Santos VLCG. Methodology: Schmidt FMQ, Aroldi JB, Peres HHC, Santos VLCG. Writing: Schmidt FMQ, Aroldi JB, Quiroz LM, dos Anjos PP, Teixeira VA. Supervision: Peres HHC, Santos VLCG.

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