

The effectiveness of a web-based education program for nurses' self-assessed skills concerning the care of alcohol-intoxicated patients in an emergency department

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Abstract

The aim of this study was to measure the effectiveness of a web-based education program for nurses' self-assessed skills concerning the care of alcohol-intoxicated patients in an emergency department. A quasi-experimental design with an intervention and comparison group was used. A quantitative approach was utilized to describe the nurses' self-assessed skills before and after a web-based education program. Within the resources of the organization that participated in this study, it was possible to deliver the intervention to 20 nurses during one year. All ninety nurses working in the emergency department of one central hospital in Finland were randomly assigned to either the intervention group (n=20) or comparison group (n=25); in both groups, baseline (November 2017) and follow-up (December 2018) surveys were conducted before and after the intervention. The intervention group members showed a statistically significant increase in their self-assessed skills in several sections of the competence scale that was used. This may indicate that the web-based education program had a positive effect on the intervention group's knowledge and improved their skills to care for alcohol-intoxicated patients.

Keywords: alcohol, continuing education, emergency department, nursing, web-based intervention

Tiivistelmä

Tutkimuksen tavoitteena oli arvioida verkkokoulutusohjelman vaikuttavuutta päivystyspoliklinikalla työskentelevien sairaanhoitajien alkoholista päihtyneiden potilaiden hoitamisen taitoihin liittyen. Kvasi-kokeellisella tutkimusasetelmalla arvioitiin kvantitatiivisin menetelmin taitojen eroja interventio- ja

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vertailuryhmän välillä ennen ja jälkeen verkkokoulutusintervention. Tutkimukseen osallistuneen suomalaisen keskussairaalan resurssien puitteissa oli mahdollisuus tarjota koulutusinterventio vuoden aikana kahdellekymmenelle sairaanhoitajalle. Tutkimukseen osallistujat jaettiin satunnaisesti keskussairaalan päivystyksessä työskentelevistä sairaanhoitajista (N=90) joko interventioryhmään (n=20) tai vertailuryhmään (n=25). Molemmat ryhmät vastasivat sähköiseen kyselyyn ennen (marraskuu 2017) ja jälkeen (joulukuu 2018) intervention toteutuksen. Interventioryhmään kuuluvat arvioivat taitonsa parantuneen verkkokoulutuksen jälkeen tilastollisesti merkitsevästi useilla eri mittauksessa käytetyn kompetenssimitarin osa-alueilla. Verkkokoulutuksella näytti olevan positiivista vaikutusta interventioryhmän tietoihin ja taitoihin hoitaa alkoholista päihtyneitä päivystyspotilaita.

Avainsanat: alkoholi, täydennyskoulutus, päivystyspoliklinikka, hoitotyö, internet-perusteinen interventio

Introduction

At-risk use of alcohol causes health problems worldwide. Its annual costs to health care are measured in the billions [1–5]. Alcohol abuse is a significant problem also in Finland despite the fact that the consumption of alcoholic beverages has diminished. Alcohol risk use causes considerable health and social problems for individuals as well as economic challenges to the healthcare system and society [6]. It increases the mortality rate and the prevalence of numerous diseases, injuries, violence, mental problems, and sexual risk behavior [7]. Because of these, hospitals are more crowded, with a higher number of patients with unexpected hospital periods and visits [8,9].

In the case of alcohol risk use, early intervention is important because it can result in reduced alcohol use, which is significant for the individual, financially, and in terms of public health [1,3,9–11]. This requires specific competence on the part of emergency department (ED) staff on how to treat alcohol abusers because it has been estimated that in about one in every three cases, ED patients' reasons for seeking treatment are related to alcohol [12]. The skills needed to care for patients of this

kind in the ED include positive attitude, knowledge and experience of alcohol risk users' care and alcohol risk use evaluation skills [13]. Based on earlier research, web-based education is a useful way to improve the skills mentioned above [2].

It has been pointed out before that with adequate training and ongoing support, nurses working in hospitals could play an active role in interdisciplinary initiatives to address unhealthy alcohol use among patients [5,14]. According to previous studies, health care professionals do not use early interventions to recognize and treat substance abuse as much as they could [3,9,15–19]. The main reason why these interventions are not used is that health professionals are not familiar with the methods that are available, they feel uncomfortable asking patients about substance abuse, or do not know what to do with the information [3,15,17].

Because of the lack of knowledge in this health care area, alcohol risk use is not identified or treated sufficiently [8,15]. Nurses' basic training includes very little education about substance abuse. As a result, continuing education has an important role in raising awareness of it. By

providing comprehensive continuing education in this area the quality of patient care could be improved [8,18,20,21]. It is important that ED nursing staff have this kind of knowledge and skills because ED is often the first health care facility that risk users attend [4].

Various teaching methods have been tested when drawing up continuing education concerning substance abuse for health care professionals. For example, computer-based simulation exercises have shown effectiveness in knowledge improvement [17]. The use of the SBIRT (Screening, Brief Intervention and Referral to Treatment) instrument has also been taught to health care staff by using Internet-based programs. The idea of SBIRT is that it helps nurses and doctors recognize substance abuse and understand what to do after that. Web-based programs have also shown good effectiveness in improving nursing staffs' skills in SBIRT use compared to their skills before attending this kind of education [2,14,16,20,22].

Today, e-learning is a popular way to arrange continuing education for professionals in health care. Computer-assisted learning, online learning, or web-based learning are all terms that are used to describe learning on the Internet [23]. Web-based learning is cost-effective because it is not dependent on location and takes less working time than on-site tutoring. That is one reason why it is well suited for the training needs of working life and its use has increased year by year [1,3,24,25]. Earlier, it was found that nurses were satisfied with the use of web-based training and web-based programs improved their knowledge [23].

The effectiveness of web-based education on substance abuse nursing has been tested, especially when updating primary healthcare professionals' knowledge and skills. According to the results of earlier studies, knowledge and skills concerning

some aspects of substance abuse nursing have improved [14,19,20,25,26]. However, these educations have been quite limited in scope and have not focused widely on the skills to care for alcohol-intoxicated patients or the ED context. In fact, it seems that there are only few studies measuring the effectiveness of comprehensive web-based educational alcohol or substance abuse nursing training on ED nursing staffs' skills. This kind of research information is needed in order for web-based education to be more widely utilized [22].

The aim of this study was to measure the effectiveness of a web-based education program for nurses' self-assessed skills concerning the care of alcohol-intoxicated patients in an emergency department.

The research question was:

Does continuing web-based education improve ED nurses' (IG) self-evaluated skills to care for alcohol-intoxicated patients in an emergency department?

The hypothesis was that the web-based education improves nurses' skills to care for alcohol-intoxicated patients.

Material and methods

Design

A quasi-experimental design with an IG and CG was used. The study was conducted among nurses working in an ED in one central hospital in Finland. A quantitative approach was used to describe the nurses' self-assessed skills before and after a web-based education program.

Intervention

The web-based education program was provided in collaboration with one Finnish University of

Applied Sciences. It was carried out as part of the University's health care studies that support continuing learning. This web-education was based on the results of earlier studies on the topic [21]. The main objective of the evidence-based web-education program (3 ECTS = 81 hours of study) was to help nurses to learn to care for acutely ill alcohol intoxicated patients in the ED. The program was designed to be an online training course and the criteria for creating the layout and structure were ease of use, feasibility and timing.

The web-education had a named teacher who was responsible for guidance and evaluations. There was no contact teaching, but the participants did get personal feedback from the teacher concerning their learning tasks. The course material was delivered online on Moodle platform and was accessible at any time suitable for the users. The course was divided into Part one (1 ECTS = 27 hours of study) and Part two (2 ECTS = 54 hours of study). The aim of the two parts was to enhance nurses' knowledge and skills in the care, assessment and management of alcohol-related disorders among acutely ill patients in the ED.

The focus of Part one was patient-centered care for patients who are under the influence of alcohol. Nurses need to understand how important relatives' support is to patients of this kind, and this was also taken into account in this part. Part one was executed as an essay and multiple-choice test which was an online exam (the evaluation was pass or fail). The focus of Part two was to identify the individuals or patient groups who might benefit from early interventions and follow-up care to reduce alcohol use. Another topic was strengthening nurses' legislative knowledge and professional ethical competence on the care of patients under the influence of alcohol in the ED. Part two was executed as a learning task, and the participants

wrote a web blog (the evaluation was pass or to be completed).

Four ED nurses who did not take part in the surveys of this study piloted the intervention. After getting their feedback, some layout formatting was done and research articles on at-risk drinking and alcohol addiction were added before the web-education program was launched for the IG.

Sample

The nurses in an ED (N=90) were randomly allocated to an IG (n=20) and a CG (n=25). Within the resources of the organization that participated in this study, it was possible to deliver the intervention to 20 nurses during one year because the education required some financial input and working time. There were five more nurses in the CG because there was a possibility to transfer some participants to the IG before the baseline survey if it was known for sure that all twenty group members would not be able to start the education for some reason. When the baseline survey was sent there was a perception that all the nurses selected would complete the education program, and no nurses were thus transferred between the groups. Figure 1 provides an overview of participants' flow through the study. (Figure 1.).

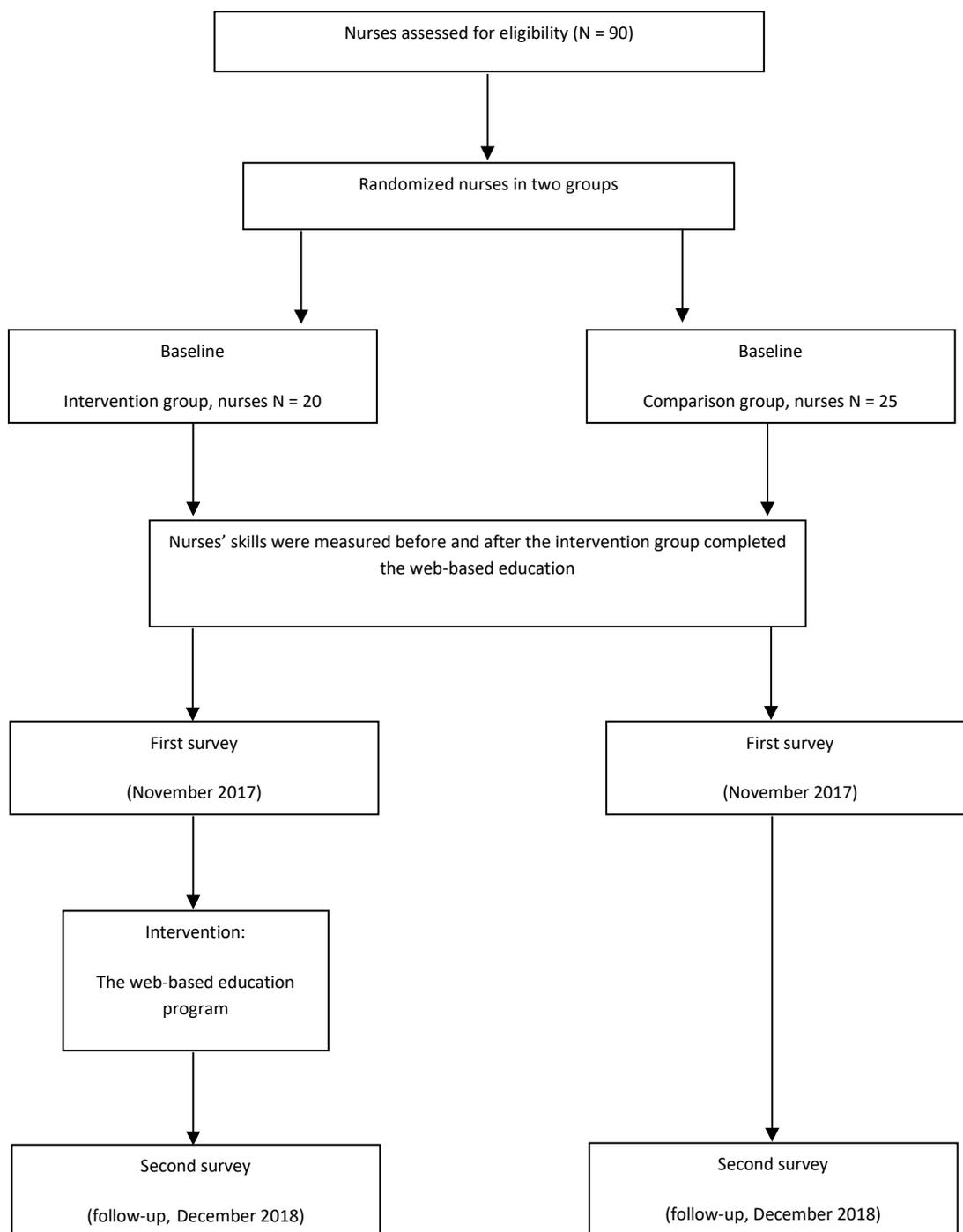


Figure 1. An overview of participant flow through the study.

The members of the IG received usernames and passwords to the education content in December 2017. All participants were given eight hours outside of work, either at home or in the workplace, for studying or finishing tasks that were included in the education; their salary for this time was covered by the organization. They also had permission to pursue their studies while working in the ED if things were quiet. Three nurses out of twenty (N=20, n=17) were not able finish the education program due to personal reasons. The remaining 17 nurses completed the program by December 2018. Both groups, the IG and the CG, underwent a survey before and after the IG had completed the continuing education. The purpose of the survey was to find out the effectiveness of the education program on their self-assessed skills.

Data collection

The ED nurses' skills of caring for alcohol-intoxicated patients were evaluated by using a quantitative self-evaluation questionnaire developed by the researchers. Surveys were conducted before (November 2017) and after (December 2018) the education program using an electronic questionnaire (Figure 1). At both phases, the nurses received a cover letter and the survey by e-mail. The response time was two weeks; a reminder message was sent once and after that, one more week was given to respond.

The instrument consisted of seven scales: 1) alcohol risk use evaluation skills (11 items), 2) interaction skills (6 items), 3) ethical skills (7 items), 4) counseling and education skills (7 items), 5) security and safety skills (9 items), 6) teamwork and network skills (5 items), and 7) follow-up treatment skills (4 items). The instrument consisted of five-point Likert-type items [21]. The Finnish version of the instrument has previously been pub-

lished as an attachment to an article which is also part of a project related to this study [27].

Analysis

The results of the baseline and follow-up surveys were analyzed statistically. Frequencies and percentages were used to describe the background data. Seven mean sum variables were formed of the scales of the instrument. Non-parametric tests were used because the sample size was small and the data was not normally distributed. Medians, minimums and maximums were calculated from the seven sum variables of both the baseline and the follow-up data. The changes in the groups were examined using Mann-Whitney U test. In addition, the differences between the IG and the CG at both stages were analyzed with Mann-Whitney U test. The analyses were performed using IBM SPSS Statistics system, version 26 for Windows.

Ethics

General ethical guidelines and legislation on health care research were followed in the study [28]. The study was approved by the Ethics Committee for Human Sciences at the University of Turku, Finland (Decision 30/2015, 8. September 2015). Answering the questionnaire was optional at both stages, i.e. the baseline and the follow-up measurement. The education program was considered as continuing education for ED nurses by their work organization. The data were treated in confidence. Before the onset of the research, participants received both, oral and written information about the research by email. Responding to the survey was considered as consent to participate in the study [29].

Results

Participants and background factors

The participants (N=45) were randomized into two groups, IG (N=20) and CG (N=25) and they had the baseline and follow-up surveys. Altogether 37 (N=45, n=37) nurses working in the ED participated in the study at the beginning. The response rate was 82.2%. At the baseline survey, there were 17

(N=20, n=17) participants in the IG (response rate 85.0%) and 20 (N=25, n=20) in the CG (response rate 80.0%). Of the 42 nurses, 26 responded to the follow-up survey (N=42, n=26). The total response rate was thus 61.9% (IG N=17, n=12, response rate 70.6%, and CG N=25, n=14, response rate 56.0%). There were slightly differences between the groups according to their background factors at both measurements. (Table 1.)

Table 1. Background factors.

	Baseline		Follow-up	
	Intervention group N = 20, n = 17 n (%)	Comparison group N = 25, n = 20 n (%)	Intervention group N = 17, n = 12 n (%)	Comparison group N = 25, n = 14 n (%)
Work experience in healthcare				
< 2 years	1 (5.9)	1 (5.0)	0	0
2–5 years	4 (23.5)	2 (10.0)	3 (25.0)	1 (7.1)
>5–10 years	5 (29.4)	6 (30.0)	3 (25.0)	2 (14.3)
>10 years	7 (41.2)	11 (55.0)	6 (50.0)	11 (78.6)
Work experience in emergency care				
< 2 years	3 (17.6)	1 (5.0)	2 (16.7)	0
2–5 years	3 (17.6)	3 (15.0)	1 (8.3)	3 (21.4)
>5–10 years	7 (41.2)	7 (35.0)	5 (41.7)	3 (21.4)
>10 years	4 (23.5)	9 (45.0)	4 (33.3)	8 (57.1)
Working in psychiatric nursing				
Yes	2 (11.8)	2 (10.0)	2 (16.7)	2 (14.3)
No	15 (88.2)	18 (90.0)	10 (83.3)	11 (78.6)
Working in intoxicant care				
Yes	5 (29.4)	5 (25.0)	1 (8.3)	3 (21.4)
No	12 (70.6)	15 (75.0)	11 (91.7)	11 (78.6)
Alcohol use related training during the last year				
Yes	1 (5.9)	1 (5.0)	0	1 (7.1)
No	16 (94.1)	19 (95.0)	12 (100.0)	13 (92.9)
Substance abuse related training during the last year				
Yes	1 (5.9)	1 (5.0)	1 (8.3)	1 (7.1)
No	16 (94.1)	19 (95.0)	7 (58.3)	7 (50.0)
Alcohol related training during the career				
Yes	2 (11.8)	8 (40.0)	3 (25.0)	7 (50.0)
No	14 (82.4)	12 (60.0)	9 (75.0)	7 (50.0)
Substance abuse related training during the career				
Yes	5 (29.4)	10 (50.0)	5 (41.7)	7 (50.0)
No	12 (70.6)	10 (50.0)	7 (58.3)	7 (50.0)

ED nurses' self-evaluated skills to care for alcohol-intoxicated patients – comparison of IG and CG

At the baseline survey, both groups evaluated that their best skills were ethical skills (IG Md 3.71 and CG Md 4.00). At the follow-up survey, the IG's skills were improved, while CG's skills stayed at the same level (IG Md 4.00 and CG Md 4.00), but the IG's progress did not reach statistical significance (IG $p=0.154$ and CG $p=0.539$). The participants in both groups considered that their poorest skills were follow-up treatment skills (IG Md 2.00 and CG Md 2.25), but at the follow-up, these skills were better (IG Md 2.75 and CG Md 2.88) and the measurement showed statistical significance in the results of the IG ($p=0.006$). At the follow-up survey, the participants in the IG evaluated their skills to be better in many of the areas that were asked

about. These improvements also reached statistical significance. Those in the CG also estimated that their skills to care for alcohol-intoxicated patients had improved between the baseline and follow-up surveys. However, this progress did not reach statistical significance. (Table 2.)

At the baseline, there was statistical significance in two skill evaluation areas: alcohol risk use evaluation skills ($p=0.044$) and counseling and education skills ($p=0.037$). The CG evaluated their skills as better (alcohol risk use evaluation skills: CG Md 3.05 and IG Md 2.73, counseling and education skills: CG Md 3.07 and IG Md 2.43) in these areas than the IG. At the follow-up, there were no longer any statistical significances between the evaluations of the two groups. (Table 2.)

Table 2. Changes and comparison between the baseline and the follow-up surveys in the intervention group (IG) and comparison group (CG).

	Group	Baseline				Follow-up			
		Md	Min	Max	p	Md	Min	Max	p
Alcohol risk use evaluation skills	IG	2.73	2.09	3.82	0.044	3.27	1.73	4.45	0.002
	CG	3.05	1.64	4.55		3.55	2.45	4.82	0.156
	IG vs. CG								0.367
Interaction skills	IG	3.00	2.67	4.67	0.055	4.00	2.50	5.00	0.008
	CG	3.75	2.50	5.00		4.00	3.00	5.00	0.153
	IG vs. CG								0.936
Ethical skills	IG	3.71	2.00	4.71	0.142	4.00	3.00	5.00	0.154
	CG	4.00	2.57	5.00		4.00	2.86	5.00	0.539
	IG vs. CG								0.640
Counseling and education skills	IG	2.43	1.86	3.43	0.037	3.71	3.14	4.57	0.001
	CG	3.07	1.29	4.57		3.50	2.14	4.71	0.213
	IG vs. CG								0.545
Security and safety skills	IG	3.56	2.56	4.44	0.056	3.94	3.00	5.00	0.039
	CG	3.89	3.00	5.00		4.00	3.44	5.00	0.276
	IG vs. CG								0.529
Teamwork and network skills	IG	3.40	2.20	4.60	0.679	3.90	3.40	5.00	0.041
	CG	3.40	2.40	5.00		4.00	2.80	5.00	0.134
	IG vs. CG								0.976
Follow-up treatment skills	IG	2.00	1.00	3.25	0.120	2.75	1.75	3.75	0.006
	CG	2.25	1.00	4.25		2.88	1.00	4.00	0.311
	IG vs. CG								0.775

Discussion

According to the results of our study, continuing web-based education improved ED nurses' self-assessed skills to care for alcohol-intoxicated patients. Similar results were obtained by Russel et al. 2017 [8] when they tested the effectiveness of a short education intervention on nurses' knowledge about substance abuse, including treatment of alcohol risk users. It was an education, lasting a few hours, during which the participants went through essential things related to substance abuse. Nurses evaluated their knowledge of this subject before and after the education. Their self-evaluated knowledge was better after the education. This shows that even short continuing education is important and effective in terms of nurses' skills in the care areas where they need improvement during their career [3,5,9,15–19]. In our study, CGs' self-assessed skills concerning the care of alcohol-intoxicated patients also improved from the baseline survey to follow-up, but the improvement did not reach statistical significance. It is possible that inside the CG there was different participants answering separate surveys or their skills become slightly better because of the practical work they did over the course of one year.

Motivation is an important factor when nurses participate in continuing education concerning substance abuse. According to the study of Coogler & Owens 2015 [11], participants should be motivated for the education mentioned above so that their skills improve and they will use the early intervention methods they have learned. The results of our study show that nurses working in the ED who participated in the education program might have been motivated because their skills improved during the learning process. After acquiring better skills to care for alcohol-intoxicated patients, it is

likely that they will also apply these skills in their work in the ED more than before, and the quality of patient care may thus develop for the better.

Interventions such as substance abuse training need to be carefully designed so as to be effective and impressive [18]. In earlier studies e-learning, also known as web-based education, has been found to be a good teaching method and it has been considered an effective way to teach new things and to recall things that have been forgotten [26,30,31]. The web-based education in our study was developed in collaboration with teaching professionals using the latest information about alcohol-intoxicated patient care. Making this education available on the web was a good way to implement it because the ED nurses could study when it was most convenient for them and they had no problems completing the web-based education.

There is also some research information that is critical towards web-based learning. Face-to-face and web-based training in motivational interviewing education was investigated. According to the findings, nursing staff were more involved in face-to-face training than web-based training [32]. In our study, three nurses could not participate in the web-based education program but it was completed by all 17 nurses who started it. The response rates in both baseline and follow-up surveys were fairly good, being over 50 percent. This shows that this kind of continuing education is possible to implement and accomplish in ED and self-assessment scale is a practical way to measure improvement. Ryhtä et al. 2021 [33] also used self-assessment when they explored the connection of an educational intervention with the competence of health care educators and educator candidates in digital pedagogy and found it a useful way to get reliable results.

Limitations

There are some limitations in our study and the generalizability can be questioned because of the small number of participants (N=45). However, the response rate was fairly good in both phases, i.e. the baseline survey and the follow-up survey. A power analysis was not performed because the education was targeted at a limited group. Differences in background factors between the groups were not examined statistically because the groups were small. Based on the data that group members reported about their background factors, the groups were quite similar and appeared to be comparable. Drop-out analysis could not be performed because respondents were anonymous and it was not known who did not respond.

Participants in the IG completed their web-based education during the year 2018. There might be some difference in the time between completing the education and taking part in the follow-up survey; the latter time point was the same time for all respondents. The competence scale that was used to measure the skills in alcohol-intoxicated patient care was not validated, but it had been tested and used in another study where Cronbach's alphas were at a good level [21]. However, despite the limitations, the findings provide new information about the use of the web-based education program of alcohol-intoxicated patient care for nurses working in ED.

Conclusion

It is possible to improve ED nurses' skills to care for alcohol-intoxicated patients with web-based continuing education. This kind of skills improvement can raise the quality of alcohol-intoxicated patient care and also make it more agreeable for ED nurses. However, web-based learning requires commitment from both ED nurses and their nurs-

ing managers because it is crucial that continuing education is completed. It is important that after the learning process, nursing managers require that nurses use the skills they have acquired and evaluate nurses' skills to care for alcohol-intoxicated patients with the competence scale every now and then, offering education when needed.

In the future, it would be important to do a similar study with a larger sample to verify the results. The instrument that was used in this study should be validated; it could then be taken extensively in to use in EDs to measure nursing staffs's skills. The web-based education program could be updated and made even more comprehensive for further use in different health care environments. In addition, the potential of simulation alongside with web-based education to improve skills in this context could also be tested.

Conflict of interests

The authors declare that they have no conflict of interests.

Author contributions

Study design: K-L.M., and M.K. conceptualized the study, but all authors were involved in study design. Development of intervention: K-L.M., E.N., T.H., and M.K. Data collection: K-L.M., E.N., and M.K. Data analysis: K-L.M., and M.K. Manuscript writing: K-L.M., J.K., E.N., T.H., and M.K. All authors contributed to revising subsequent versions of the manuscript, and to approving the final manuscript.

Ethical statement

The study was approved by the Ethics Committee of the University of Turku (Decision 30/2015, 8. September 2015).

Funding

This work was supported by the Satakunta Hospital District (Government Research Financing 81902, Decision 57/2016, 82003 Decision

135/2017, 84012 Decision 158/2019) and the Hospital District of Southwest Finland (Government Research Financing 81902, Decisions 7/2015 and 15/2016).

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