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Research Article

Effect of Web-based Learning on Content Knowledge and Practice Regarding Care of Patients with Tracheostomy among Second Year B.Sc. Nursing Students

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Abstract

Introduction: Education is a process, which is to bring about desirable changes in the behavior of the learner in the form of acquisition of knowledge, proficiency in skill, and development on attitude. **Objectives:** The objectives of the study were to assess effect of web-based learning on content knowledge and practice regarding care of patient with tracheostomy among 2nd year B.Sc nursing students. **Materials and Methods:** Quantitative approach with quasi experimental design was used and samples were 2nd year B.Sc nursing students selected through non-probability convenient sampling. Data have collected from 97 2nd year B.Sc nursing students through structured questionnaire to assess knowledge, Likert scale to assess practice through OSPE. Pilot study followed by actual data collection was done and analyzed using descriptive and inferential statistics. **Results:** Statistical analysis shows that mean difference in pre-test and post-test knowledge score was 6.84 in the experimental group whereas in control group it was 0.44. Wilcoxon signed-rank test indicates that the difference in the knowledge mean score of experimental group was statistically significant high than that of control group. Significant difference in the practice mean score of both the groups was 84.61 in experimental group and 44.17 in control group. A greater difference in mean score was observed in the experimental group. Considering opinion of the students 93.9% had a favorable opinion toward web-based learning whereas 6.12% of the students had an unfavorable opinion toward the same. Hence, web-based learning was more effective in improving knowledge and practice regarding care of patients with tracheostomy. **Discussion:** Finding revealed that web-based learning is effective in improving knowledge and practice regarding care of patients with tracheostomy. **Conclusion:** Web based learning is effective in improving knowledge & practice regarding care of nursing among second year B.Sc nursing students.

Key words: Care of patients with tracheostomy, Content knowledge, Practice, Second year B.Sc Nursing students, Web-based learning

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Introduction

Education brings desirable changes in the knowledge, skill, and development on attitude. Learning is the process of growth and development where the learner acquires a body of knowledge, develops the ability to use knowledge in the pursuit of ideas. Learning brings modification of behavior.[1]

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Worldwide has seen a huge growth in the education system in all aspects in the past 50 years. However, the education system has faced the greatest challenge in the COVID-19 pandemic. Educational institutes have been closed since then. However, education has been continuing with digital teaching and online learning. E-learning has become more effective in the COVID-19 crisis.[2]

A descriptive cross-sectional study has been done on experience of e-learning during the COVID-19 pandemic at the medical college. This study elaborated the benefits and

effectiveness of digital learning environment. The result supported for future implementation of online education.[3]

Internet is the ocean of knowledge; thus, it is desirable to access this ocean to all the students early in their life. This can be done by introducing or using information technology and related tools in school education or using the World Wide Web (www) as an education delivery medium. The "www" is used not only to disseminate information but also provides a great opportunity to extend learning outside space and time boundaries. Web-based learning has the potential to satisfy the perceived need for versatile pace, place, and face. The internet permits education to travel to the learner instead of the learner to their education.[4]

A qualitative study has done to explore the perception and effectiveness of web-based learning on clinical skills in nursing students. Web-based learning might be effectively to reduce the gap between theory and practice. Web-based learning develops higher and quality talent among nursing students additionally improves skill.[5]

A study conducted on the effect of web-based education on nursing students regarding urinary catheterization. The result obtained confirms that students in the web-based group obtain the highest score in knowledge and skill as a substitute to traditional intervention.[6]

A tracheostomy is the superior alternative for long-term care. Tracheostomy is useful for fewer risks of long-term harm to the airway. Tracheostomy care is a basic nursing skill. Tracheostomy is a common procedure done in ICUs. Care of a patient with tracheostomy includes suctioning the airway to remove secretions, cleaning around the stoma, and changing tracheostomy ties.[7]

Care of patients with a tracheostomy is a common procedure in the critical care unit. A tracheostomy is a surgical incision made into the inferior border of the cricoid cartilage of the trachea for the patient with the impaired gaseous exchange. Tracheostomy care means changing the tracheostomy inner tubes, suctioning, cleaning the tracheostomy site, and changing dressing around the tracheostomy tube using an aseptic technique. The main purpose of tracheostomy is to maintain a patent airway.[8]

The education system has been interrupted due to the COVID-19 pandemic. The educational institute has more challenges for smoothly functioning the teaching-learning process in this pandemic situation. A study revealed that web-based learning is more significantly used during the COVID-19 pandemic.[9]

A descriptive study was conducted on 50 registered nurses to know their experience regarding web-based learning. Result showed that web-based learning is effective in delivery of nursing education.[10]

A study conducted on graduate nurses to know the comfort level in caring for patients with tracheostomy. Results revealed that hands-on skill is necessary during the induction program to report comfortable while providing actual tracheostomy care. There was no correlation between knowledge and comfort regarding tracheostomy care. The study suggested incorporating specialized skill training into residency programs which improve quality patient care.[11]

Most of the time tracheostomy patients are being cared in the general ward. Staff nurses having a lack of skill and knowledge; lack the confidence to provide tracheostomy. Even no proper guidelines and resources are available in the ward. Hence, there is a need for education and proper training regarding tracheostomy care.[12]

Tracheostomy care is incorporated in the 2nd year B.Sc. nursing curriculum prescribed by the Indian Nursing council. Lectures and demonstrations are routinely practiced as common teaching strategies in nursing colleges. Students possess lack of skill to provide tracheostomy care independently when they are posted in the critical care unit and even in the wards.[12]

As a researcher's experience in the medical surgical, clinical postings felt the need to enhance students' knowledge on tracheostomy cares. Hence, web-based module can be one of the teaching strategies which can improve knowledge and skill of doing tracheostomy care. Students can be pursued interest within them by using computerized-based learning to develop competence regarding various advanced procedures in the clinical setting.[12]

Providing critical care to the patient has become an integral part of the nursing care in critical care or general medical-surgical units, extended care facilities and at home. The nurses, physicians, and respiratory therapists must possess good knowledge and understand each patient's specific pulmonary need and work together to set realistic goals.[13]

A study was conducted on E-learning during COVID- 19 pandemic. The study concluded that, E-learning has become more popular among all students particularly during lockdown period due to the COVID-19 pandemic.[14]

The researcher during her work experience observed that many nurses especially fresh graduates have minimal knowledge and skill about providing tracheostomy care.[13] Furthermore, as a researcher's experience, web-based learning is one of the effective tools to deliver as well as self-efficacy as competence among 2nd-year B.Sc. nursing students to perform tracheostomy care.[5] Therefore, as per the experience of the investigator, it is felt that if we tend to strengthen the cognitive content of student nurses relating to tracheostomy care throughout student life, we will be able to produce additional economical nurses for society. This prompted the researcher to take the study.

Web-based learning helps to improve knowledge, enhance the skill, improve critical thinking, and student can be able to provide care in the clinical with confidence. Web-based learning provides motivation to students for learning. Web-based learning improved or enriched their learning and increased confidence in their understanding of concepts. Even students reported appreciating the ability to review WBL while studying or preparing for exams.[15]

Objectives of the study

The objectives are as follows:

I. To assess the content knowledge regarding care of patients with tracheostomy before and after intervention in the experimental group.
II. To assess the content knowledge regarding care of patients with tracheostomy in control group.
III. To assess practice through the objective structured practice examination regarding care of patients with tracheostomy after intervention in the experimental group.
IV. To find out the opinion about web-based learning regarding care of patients with tracheostomy among nursing students.

Materials and Methods

This study uses a quasi-experimental two group pre-test post-test design with non-probability convenient sampling method used. The present study was conducted for 97 2nd Year B.Sc nursing students from selected two Nursing colleges of Navi Mumbai which was divided in experimental and control group. In this study, dependent variable was content knowledge and practice regarding care of patient with tracheostomy and independent variable was the web-based learning. Study was conducted at two nursing colleges of Navi Mumbai. In this study, the inclusion criteria were the following:

Second year B.Sc Nursing students who were:

1. Present during the study.
2. Willing to participate in the study.
3. Previously not taught in the class about tracheostomy care.

Many studies were reviewed and frequent interactions with the expert were done to develop the tool. Initially, with the help of repeated review of the literature, researcher prepared a module. In this study, structured questionnaire used to assess knowledge and Likert scale to assess the practice regarding care of patients with tracheostomy through OSPE. Content validity of the tool and module was done by 17 experts. The reliability of the structured questionnaire and Likert scale was done by Cronbach's Alpha method. Ethical approval was obtained from the Institutional Ethical Review Committee of MGM Institute of Health Sciences, Kamothe, on Oct 2020. Permission was obtained from guide and authorities of the selected nursing colleges for data collection. Informed consent was obtained from each sample involved in the study before collecting the data. The objectives of the module helped the researcher in preparing the blue print for the instruments which were constructed to assess the knowledge and practice in relation to care of patient with tracheostomy. Pilot study was conducted from January 15, 2021, to January 22, 2021, at nursing college of Navi Mumbai on ten samples. The finding of the study helped the investigator to visualize the practical problems that could be encountered while the conducting main study like arranging for the dated to conduct the study. The tool and module were prepared in English since the study dealt with 2nd year B.Sc Nursing Students. Researcher prepared a module that would be published on Website of MGM New Bombay College of Nursing which will be used by the students of the experiment group. Password has been given to the module and shared with students in the experimental group on the day of pre-test. After 7 days researcher has conducted post-test on knowledge and assessed practice through the objective structured practice examination regarding care of patients with tracheostomy.

Results and Analysis

Analysis of the study is organized in the following manner:

- Section I: Analysis of demographic data of B.Sc nursing students [Table 1].
- Section II: Analysis of knowledge regarding care of patients with tracheostomy among 2nd year B.Sc nursing students [Tables 2-5].
- Section III: Analysis of practice regarding care of patients with tracheostomy among tracheostomy care among 2nd year B.Sc nursing students [Tables 6 and 7].
- Section IV: Analysis of students' opinion toward web-based learning [Table 8].

Section I: Analysis of demographic data of B.Sc nursing students

Section I

Distribution of sample based on demographic data using frequency and percentage among experimental and control group.

Table 1 depicts; that out of 97 students, majority 42 (85.7%) students from experimental group and 38 (79.1%) students from control group were in the age group of 19 and 20.

Majority 48 (98%) female students were in the experimental group; whereas 37 (77.1%) female students in the control group.

Majority 37 (75.5%) students were having previous knowledge regarding tracheostomy care in the experimental group; whereas 43 (89.6%) students were having previous knowledge regarding tracheostomy care in the control group.

In the experimental group, 18 (36.7%) students have got information from book and 18 (36.7%) students have

Table 1: Distribution of sample based on demographic data using frequency and percentage among experimental and control group

	n=97			
Demographic data	**Experimental group (*n*=49)**		**Control group (*n*=48)**	
	f	**%**	**f**	**%**
Age in years				
18	4	8.2	2	4.2
19	25	51	22	45.8
20	17	34.7	16	33.3
21	1	2	7	14.6
>21	2	4.1	1	2.1
Gender				
Female	48	98	37	77.1
Male	1	2	11	22.9
Previous knowledge				
Yes	37	75.5	43	89.6
No	12	24.5	5	10.4
Source of information Where/Whom…				
Friends	0	0	2	4.2
Books	18	36.7	22	45.8
Magazines/Mass Media	0	0	0	0
Observed in Hospital	18	36.7	20	41.7
Others	13	26.5	4	8.3
Have Parent hospital				
Yes	48	98	0	0
No	1	2	48	100
Types of Hospital				
Private Hospital	0	0	0	0
Teaching Hospital	49	100	48	100
Non-Teaching Hospital	0	0	0	0
General Hospital	0	0	0	0
Specialized Hospital	0	0	0	0
Community Hospital	0	0	0	0
Others	0	0	0	0
Is tracheostomy care previously taught in class				
Yes	20	40.8	34	70.8
No	29	59.2	14	29.2

observed procedure in the hospital; whereas in the control group 22 (45.8%) students have got information from books while 20 (41.7%) students have observed in the hospital.

Majority 48 (98%) students had parental hospital in the experiment group; whereas in the control group none of the students had parental hospital. They were posted in the other affiliated institutions of the college.

Majority 49 (100%) students in the experimental group were having teaching hospital; also 48 (100%) students in the control group were having teaching hospital.

In experimental group, only 20 (40.8%) students said that tracheostomy care was previously taught in class; whereas in the control group 34 (70.8%) students said that tracheostomy care was previously taught in class.

Section II: Analysis of knowledge regarding care of patients with tracheostomy among 2nd year B.sc nursing students

Section II A

Distribution sample based on knowledge regarding care of patients with tracheostomy in the experimental group.

Table 2 shows that out of 49 students in experimental group; majority 40 (81.63%) students had average knowledge and 9 (18.37%) had poor knowledge during the pre-test; whereas majority 42 (85.71%) students had good knowledge and 7 (14.29%) students had an average

knowledge regarding tracheostomy care during the post-test.

Section II B

Distribution of sample based on knowledge regarding care of patients with tracheostomy in the control group.

Table 3 shows that out of 48 students in the control group; majority 39 (81.25%) students had average knowledge and only 1 (2.08%) had good knowledge during pre-test and during post-test, majority 35 (72.92%) students had an average knowledge and 12 (25%) students had poor knowledge regarding care of patients with tracheostomy.

Table 2: Distribution sample based on knowledge regarding care of patients with tracheostomy in the experimental group

n=49				
Category	**Experimental group**			
	Pre-test		**Post-test**	
	f	**%**	**f**	**%**
Good	0	0	42	86
Average	40	81.63	7	14
Poor	9	18.37	0	0

Table 3: Distribution sample based on knowledge regarding care of patients with tracheostomy in the control group

n=48				
Category	**Control group**			
	Pre-test		**Post test**	
	f	**%**	**f**	**%**
Good	1	2.08	1	2.08
Average	39	81.25	35	72.92
Poor	8	16.67	12	25

Section II C

Effect of web-based learning on knowledge score regarding care of patients with tracheostomy in the experimental group.

Table 4 depicts that the mean pre-test knowledge was 9.55 with standard deviation 2.26; whereas the post-test mean was 16.39 with a standard deviation 1.50. Wilcoxon signed-rank test was applied to find whether there is statistically significant difference between the pre- and post-knowledge score. The *P*-value of 0.00 (<0.001) indicates that there is statistically high significance difference between the pre and post-test in knowledge score in the experimental group.

Hence, H_{01} is rejected. The web-based learning was found to be effective in improving the knowledge regarding care of patient with tracheostomy in the experimental group.

Section II D

Comparison of knowledge score regarding care of patients with tracheostomy in the experimental and control group.

Table 5 depicts that in experimental group; the mean difference pre-test knowledge score was 6.84 with standard deviation -0.76 whereas in control group mean difference was 0.44 with a standard deviation difference 0.24.

Wilcoxon signed-rank test was applied to find whether there is statistically significant difference between the knowledge score of experimental group and control group. The *P*-value of 0.00 (<0.05) indicates that there is statistically high significant difference between the knowledge score of experimental group and control group.

Web-based module was more effective in improving the knowledge regarding tracheostomy care among 2nd year B.Sc nursing students.

Table 4: Significance of difference in the pre-test and post-test mean knowledge scores regarding care of patients with tracheostomy using Web Based Learning in the experimental group

n=49									
Knowledge	**Pre-test**		**Post-test**		**Difference**		**W**	***P*-value**	**Level of significance**
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**			
Experimental Group	9.55	2.26	16.39	1.5	6.84	-0.76	17.91	<0.001	S

*S: Significant. *Statistically highly Significant at 0.1% level, that is, *P*<0.001

Table 5: Comparison of the overall mean knowledge score among experimental and control group in relation to care of patients with tracheostomy

n=97									
	Pre-test		**Post test**		**Difference**		**W**	***P*-value**	**Level of significance**
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**			
Experimental Group	9.55	2.26	16.39	1.5	6.84	−0.76	17.91	<0.001	S
Control Group	9.65	2.24	9.21	2.48	0.44	0.24	1.1	0.276	NS

*S: Significant, NS: Non-Significant. *Statistically highly Significant at 0.1% level, that is, *P*<0.001

Section III: Analysis of Practice regarding care of patients with tracheostomy among tracheostomy care among 2nd year B.sc nursing students

Section III A

Distribution of sample based on overall practice score regarding care of patient with tracheostomy in the experimental and control group.

Table 6 shows in the experimental group, high level of practice regarding tracheostomy care was observed for all 49 (100%) students; whereas low level of practice regarding tracheostomy care was observed for all 48 (100%) students in the control group.

Hence, it interpreted that practice score was improved after administration of web-based module in the experimental group compared to control group.

There is an improvement in the post-test practice score of tracheostomy care in the experimental group after administration of web-based module.

Section III B

Comparison of practice score regarding care of patients with tracheostomy in the experimental and in the control group.

Table 7 depicts that in experimental group; the mean practice score was 84.61 with standard deviation of 2.01; whereas in the control group mean practice score was 44.17 with a standard deviation 1.97.

Table 6: Distribution of sample based on overall post-test practice score regarding care of patient with tracheostomy among 2nd year B.Sc nursing students in the experimental and control group

n=97				
Practice	**Experimental group**		**Control group**	
	f	**%**	**f**	**%**
High level of observed practice	49	100	0	0
Moderate level of observed practice	0	0	0	0
Low level of observed practice	0	0	48	100

Wilcoxon signed-rank test was applied to find whether there is statistically significant difference between the practice score of experimental and control group. The *P*-value of 0.00 (<0.001) indicates that there is statistically high significance difference between the practice score of experimental and control group.

Hence, H_{02} is rejected. Web-based learning was more effective in improving practice regarding care of patients with tracheostomy.

Section IV: Analysis of students' opinion toward web-based learning

Table 8 shows that majority of the students 93.88% had a favorable opinion toward web-based learning; whereas 6.12% of the students had an unfavorable opinion toward the same.

Discussion

Majority 40 (81.63%) students had average knowledge regarding care of patient with tracheostomy before administration of web-based module in the experimental group; whereas after the administration of web-based module, majority 42 (85.71%) had a good knowledge score. Statistically proved that after administration of web-based module significantly improved the mean knowledge score regarding tracheostomy care from 9.55 to 16.39. A cross-sectional study done in 2013 also revealed that knowledge and competency were improved from 3.1 to 18.8 regarding tracheostomy care. There was significant improvement in knowledge regarding tracheostomy care after intervention of standardized tracheostomy education module.[16]

The present study also revealed that, after the intervention of web-based module in the experimental group regarding practice of tracheostomy care, all the 49 (100%) students had high level of practice in the post-test. None of the students were in the moderate and low level of practice. There was a high significant difference in the practice mean score as 84.61 in experimental group and 44.17 in control group. A greater difference in practice score was observed in the experimental group which was consistent with the quasi-experimental study conducted on 50 staff nurses which also concluded that satisfactory performance (49.48%) of tracheostomy care before intervention of video assisted learning module on tracheostomy care;

Table 7: Comparison of the overall mean practice score in the experimental and control group in relation to care of patients with tracheostomy

n=97							
Practice	**Post-test**		**Difference**		**Wilcoxon sign rank test**	***P*-value**	**Level of significance**
	Mean	**SD**	**Mean**	**SD**			
Experimental Group	84.61	2.01	−40.44	−0.04	8.515**	<0.001	S
Control Group	44.17	1.97					

*S: Significant. **Statistically highly Significant at 0.1% level, that is, *P*<0.001

Table 8: Distribution of opinion score of the students toward web-based learning in experimental group

n=49			
Category	**Opinion Score**	**f**	**%**
Favorable	50	46	93.88
Unfavorable	30	3	6.12

whereas practice was improved after intervention by good performance (74.28%).[17]

The researcher also found that 93.88% students had a favorable opinion toward web-based module. Hence, students were more interested in web-based learning. A cross-sectional study also revealed that 91.6% nurses had highly favorable opinion toward adapting web-based learning.[18]

Hence, it was revealed that web based learning was found effective in improving the knowledge and practice regarding tracheostomy care among 2nd year B.Sc nursing students.

A quasi-experimental study conducted on staff nurses to asses effect of video assisted Teaching Module on knowledge and skill regarding tracheostomy care. The result showed that effective improvement in knowledge and skill regarding tracheostomy care after intervention program.[17]

Conclusion

The findings of the study revealed that web-based learning was effective in improving the knowledge and practice regarding care of patient with tracheostomy. There was high significant change observed in knowledge and practice regarding tracheostomy care after the intervention of web-based module. Furthermore, students had a favorable opinion toward web-based learning.

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Conflict of Interest

The authors declare no conflict of interest in the study.

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