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Effect of PETTLEP-based mental imagery on nursing and midwifery students' skill of wound dressing and anxiety

Azam Saeidikia[a], Mohadeseh Hosseinzadeh[b], Ehsan Saeidikia[c], mahbobeh Saeidikia[d], Shahnaz Tabiei[e]*, Mostafa Hosseinzadeh[f]

[a] MSc.Department of Nursing and Midwifery, Faculty of Nursing, Imam Khomeini Hospital in Shirvan, North khorasan University of Medical Sciences, bojnurd , Iran. email: Nurse.saedikia@yahoo.com
[b] Department of Medical Surgical Nursing, Faculty of Nursing, Birjand University of Medical Sciences, Iran. email:moh.hosseinzadeh75@bums.ac.ir
[c] Department of Emergency Medicine Service, School of Nursing, North khorasan University of Medical Sciences, bojnurd,Iran. email:a.nurse.saedikia@gmail.com
[d] Elementary education student, Farhangian University, Imam Jafar Sadiq Campus, North khorasan, bojnurd, Iran. email:m.saeidikia@yahoo.com
[e] Instructor of Nursing, Department of Medical Surgical Nursing, School of Nursing and Midwifery, Birjand University of Medical Sciences, Iran. email: shahnaztabiee@bums.ac.ir
[f] Environmental health student, School of Health, Birjand University of Medical Sciences, Iran.
*Corresponding author: Shahnaz Tabiei, Email: Nurse.saedikia@yahoo.com
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Abstract

Background and Aim: The fundamental objective of educating nursing and midwifery students is to develop their functional and clinical abilities adequately in a way that guarantees safe care for patients. To do this, the most proficient method(s) ought to be embraced to boost student aptitudes and learning. This study aimed to identify the Effect of PETTLEP-based mental imagery on nursing and midwifery students' skill of wound dressing and anxiety.

Methods: This randomized controlled field trial was carried out on 68 nursing and midwifery students at Birjand University of Medical Sciences (BUMS). Initially, the participants completed a demographics form, Movement Imagery Questionnaire- Revised (MIQ-R), Spielberger's State Anxiety Inventory (SAI), and a wound dressing checklist were filled by the participants. Then, the participants were randomly allocated to control and experimental groups and the PETTLEP model-based mental imagery technique for dressing was taught to the latter group over a 90-minute session. The experimental group rehearsed mental imaging for wound dressing three times a week for about a month at the clinical skills lab situated in BUMS while the control group practiced the routine wound dressing skills in the same time span. When the instructional sessions ended for all students, Spielberger's State Anxiety Inventory (SAI) and checklist for wound dressing were completed again.

Results: After adjusting the mean score of anxiety before the intervention, statistical analysis showed that the mean score of anxiety after the intervention score and its mean score changes in the two groups were not significantly different ($p > 0.05$). Also, after adjusting the baseline mean score of simple wound dressing, the mean score of wound dressing skill after the intervention score and its mean score change in the experimental group were significantly higher than those of the control group ($p < 0.001$)

Conclusion: The PETTLEP-based mental imagery practice contributes to the development of wound dressing skills in students. Therefore, application of this method is suggested for teaching the skills sought in the FUNDAMENTALS OF NURSING course for nursing and midwifery students.
Keywords: Anxiety, Mental imagery, PETTLEP, wound dressing

Introduction

Nursing, as both a science and craft, intends to assist students with procuring essential information, abilities and perspectives in psychological, affective and psychomotor terms. In this case, training skills is vital, as medical caretakers are required to be proficient and give high-caliber, and meticulous care to patients (Karabacak, Serbest, Kan Öntürk, Eti Aslan, & Olgun, 2013). Therefore, a great deal of the courses that nursing and midwifery students must take center around practical and clinical training (Delaram & Shams, 2019). Notwithstanding the constant emphasis on the significance of pragmatic and clinical skills, research discoveries demonstrate that there is a gap between the practical and clinical skills gained by nursing and midwifery students and the ideal status (Ezzati, Tafazoli, Mazlom, & Asgharipour, 2018). A 2004 investigation of 7,500 nursing graduates in the United States by Kenward revealed that, although 75.5% of them were registered, one-fifth of them experienced problems with their clinical tasks. Also, 52% of them related that they were not set up to work in a genuine clinical setting (Hickey, 2010).

A research study in Iran during 2006 found that 3.61% of nurses and 64% of head-nurses perceive the clinical competence of nurses as low (Azemian, 2014). In nursing and midwifery departments, the *FUNDAMENTALS OF NURSING* is the primary course where students figure out how to utilize their nursing aptitudes. One of the significant learning objectives of this course is acquiring psychomotor skills, which is carried out in a clinical skills lab over a long time span (Sheikhaboumasoudi, Bagheri, Hosseini, Ashouri, & Elahi, 2018).

To this aim, the most proficient training techniques ought to be utilized to boost learning and instruct students as experts. This explains why a few studies have attempted to augment the learning of practical skills in students utilizing new techniques like peer training and mobile technology (Hancock, Naber, Cross, & Mailow, 2016; Lee, Min, Oh, & Shim, 2018). Mental imaging is another strategy utilized to this aim. Imagery as a viable method to improve execution of motor skills is defined as ‘using all the senses to create or recreate an experience in the mind’ (Wright & Smith, 2007).

Mental imagery is a procedure in clinical training that has been utilized to learn essential surgical skills and other advanced skills including laparoscopic medical procedure, and to speed up the transition of recently graduate registered nurses into practice (Boehm & Alice, 2013; Cumming Williams, 2012; Hui, 2015; Sanders, Sadoski, Bramson, Wiprud, & Van Walsum, 2014; Wright, Hogard, Ellis, Smith, & Kelly, 2008; Wright, Wakefield, & Smith, 2014). It has been revealed by the neuroscientists that there is a ‘functional equivalence’ between imagery and physical performance, which may clarify imagery’s performance-enhancing effects (9).

A model of imagery known as PETTLEP has been built up by Holmes and Collins (2001). Each letter in the given acronym represents a certain type of practice while offering an imagery intervention. The letters respectively refer to physical, environment, task, timing, learning, emotion and perspective components (Wright & Smith, 2007). The physical part relates to the position and equipment used during task completion, while the environment alludes to the imagery setting which should be similar to the routine context in which a certain skill appears. The timing element refers to the speed of imagery which should be identical with that of a genuine task. Learning indicates to imagery adjustment when proficiency for a skill is picked up. The emotion represents the feelings associated with fulfillment of a task. Finally, perspective can be either inward, i.e. targeting a first person or external, aiming at a third person (Razieh, Hasan, & Reza, 2016; Wright et al., 2008).

The PETTLEP model was tested in sport psychology with positive outcomes. Nonetheless, according to Holmes and Collins (2001), the model would benefit if tested

comprehensively in different settings including nursing in which the viability of imagery has never been assessed (Wright & Smith, 2007). One of the essential advantage of imagery is elevated self-assurance as well as lower anxiety (Revermann, 2019) with the latter as a feeling associated with tension and uneasiness (Shearer, 2016). As the review of literature demonstrates, imagining of the effective completion of a skill enables the person to accept that they are genuinely ready to finish that task because there is an indistinguishable connection between self-assurance and anxiety. Hence, developing self-assurance can decrease one's anxiety (Revermann, 2019). Studies have shown that first-year nursing and midwifery students generally experience significant levels of pressure and anxiety (Chernomas & Shapiro, 2013).

College is a period of incredible progress in one's educational life which can be a cause for incredible pressure and tension. Learning new skills can also be distressing in its own right (Ramadan & Ahmed, 2015). Significant levels of tension and stress can possibly disrupt emotional wellness (Ramadan & Ahmed, 2015) and decline the students' capacity to hold the information offered, which may result in many mistakes and diminished accomplishment in the nursing programs (Shearer, 2016). Therefore, nursing students have to realize how to deal with their stress and nervousness (Ramadan & Ahmed, 2015). This study was carried out to assess the effect of PETTLEP-based mental imagery on nursing and midwifery students' skill of wound dressing and anxiety.

Methods

The current study as a randomized controlled field trial was carried out on 68 nursing and midwifery students in the clinical skills lab of Birjand University of Medical Sciences.

Procedure

Having obtained the ethical code (IR.BUMS.REC.1398.293) from Birjand University of Medical Sciences to purpose of the study, the researcher presented the objectives of the study to the students at the faculty of nursing and midwifery. Inclusion criteria comprised of willingness to participate in the study, signing consent forms, and obtaining a score above 16 on the revised movement imagery questionnaire (MIQ-R). In case the students had a history of working in hospitals and medical centers and/or received mental imaging training before, they were excluded from the study.

At baseline, all the students were asked to Spielberger's State Anxiety Inventory (SAI). The OSCE for wound dressing skills was also administered as a pretest. Next, the students were assigned randomly to experimental (n=34) and control (n=34) groups. Also, over a 90-minute session, the mental imagery technique was introduced to the experimental group according to PETTLEP model. A specialized psychologist checked and confirmed the educational content as well. Mental imagery was practiced by the experimental group three times per week for about one month in line with the PETTLEP model for wound dressing skill at the clinical skills lab where a research assistant was also present. For more supervision, the psychologist attended some sessions. Over the same time period, the routine wound dressing skills were practiced by the control group. The OSCE (post-test) test was administered at the end of the training sessions once more. It is noteworthy that the same evaluator assessed the students in the wound dressing skill station in the pre- and post-test phases for which the same checklist was used.

Research tools

A demographic information form, which covered age, gender, and interest in the academic field of study; the Movement Imagery Questionnaire- Revised MIQ-R, the Spielberger's State Anxiety Inventory (SAI), and a dressing wound skill checklist were used as data collection tools.

Hall and Pongrac developed the Movement Imaginary Questionnaire in 1983. This inventory was later modified by Hall and Martin in 1997 (Forlenza, 2010). This instrument, which consists of 8 items, examines the visual and sensory-motor skills. The answers were arranged along a 7-point Likert scale (1= very difficult to picture/feel; 7= very easy to picture/feel). The total score ranged from 8 to 52, and higher scores indicated a higher mental imagery ability and lower scores

showed a low imagery capacity. The present study employed MIQ-R for screening purposes based on which a minimum score of 16 is needed as an indicator of a moderate mental imagery competence. As regards the reliability of the questionnaire, an internal consistency coefficient of 0.83-0.89 was reported for visual and sensory-motor dimensions (Beizaee, Rejeh, Heravi-Karimooi, Tadrisi, Griffiths, & Vaismoradi, 2018; Cumming & Williams, 2012; Revermann, 2019; Shearer, 2016). Cronbach's alpha was used to estimate the reliability of the instrument. The coefficient was 0.85, which indicated a satisfactory reliability for this tool.

Spielberger's State Anxiety Inventory (SAI) was developed by him as a part of the State-Trait Anxiety Inventory (STAI) Questionnaire (1970) (Ebrahimi, Ranjbar, & Monjamed, 2002). The responses to the items in this 20-item instrument are based on a 4-point Likert scale (1= Never; 7= very much) with a score ranging from 20-80. Higher scores indicated a higher level of anxiety, whereas lower scores showed lower anxiety. In this study, the Cronbach's alpha coefficient of was 0.790, which indicates that the reliability of this tool is satisfactory.

The checklist for wound dressing skills was created by the members of the Nursing and Midwifery School at Birjand University of Medical Sciences in 2018 drawing Taylor's Fundamentals of Nursing book (2018). The checklist comprising of 21 items assessed students' wound dressing skills. The overall score ranged from 0 to 10, hence a higher score meant a higher skill level. To confirm the content validity of the checklist, it was submitted to five faculty members of the Nursing and Midwifery School. Next, the OSCE test was developed and applied to 15 students to check the checklist reliability. The ICC (intraclass correlation coefficient) estimate was used to calculate the inter-rater reliability of the nasogastric tube insertion checklist. The reliability value gave 0.7 as an indicator of appropriate inter-rater reliability.

Methods of data analysis

Data were analyzed in the SPSS statistical software, version 15. First, the normality of data distribution was assessed using the Kolmogorov-Smirnov test. The chi-square test was employed to compare demographic characteristics in the two groups. The two groups had significant differences in terms of gender and interest in the field ($p<0.05$). Accordingly, ANCOVA was used to eliminate the confounding impact of these two variables. The significance level was set at $p <0.05$.

Results

Out of 68 students, 34 (50%) were allocated to the experimental group while 34 (50%) were included in the control group. Table 1 shows the frequency distribution of students' demographic characteristics in the two studied groups.

Table 1. Comparison of the frequency distribution of experimental and control groups by demographic characteristics.

Group		Experimental	Control	Chi-square p-value
Variable		Number (percent)	Number (percent)	
Gender	Male	19 (55.9)	4 (11.8)	<0.001
	Female	15 (44.1)	30 (88.2)	
Age	18 y	10 (29.4)	9 (26.5)	0.95

	19 y	14 (41.2)	14 (41.2)	
	20 or older	10 (29.4)	11 (32.4)	
Interest in the field of study	No	8 (23.5)	2 (5.9)	0.04
	Yes	26 (76.5)	32 (94.1)	

The statistical analysis of demographic characteristics showed that the two groups had significant differences in terms of gender and interest in the field ($p<0.05$). Accordingly, ANCOVA was used to eliminate the confounding impact of these two variables.

Regarding the anxiety variable, the results of ANCOVA showed that gender and interest in the field did not have a significant effect on the mean score of anxiety before the intervention ($p> 0.05$). However, the anxiety score before the intervention was significantly effective in the post-intervention mean score of anxiety and its mean score change ($p <0.05$). After adjusting the mean score of anxiety before the intervention, the mean score of anxiety after the intervention score and its mean score changes in the two groups were not significantly different ($p> 0.05$) (Tables 2 and 3).

Table 2. The result of ANCOVA related to the post-adjustment comparison of the mean anxiety score in students of the two groups based on baseline anxiety score, gender, and interest in the field.

Time	Source of changes	Sum of squares	Degree of freedom	Mean squares	F	Significance level
Before intervention	Gender	21.89	1	21.89	0.88	0.35
	Interest in the field	0.04	1	0.04	0.001	0.97
	Group	53.48	1	53.48	2.14	0.15
After intervention	Prior anxiety	124.14	1	124.14	4.63	0.04
	Gender	0.50	1	0.50	0.02	0.89
	Interest in the field	9.15	1	9.15	0.34	0.56

	Group	20.30	1	20.30	0.76	0.39
Mean changes	Prior anxiety	832.16	1	832.16	31.04	<0.001
	Gender	0.50	1	0.50	0.02	0.89
	Interest in the field	9.15	1	9.15	0.34	0.56
	Group	20.30	1	20.30	0.76	0.39

Table 3. Mean score of anxiety before and after the intervention and its mean score changes in the two study groups before and after adjustment based on prior anxiety score, gender, and interest in the field.

Time	Group	Before adjustment		After adjustment	
		Mean	Standard deviation	Mean	Standard error
Before intervention	Control	43.53	5.79	43.83	0.92
	Experimental	42.09	3.95	41.79	0.92
After intervention	Control	44.35	5.79	44.20	0.96
	Experimental	45.32	4.66	45.48	0.96
Mean score change	Control	0.82	6.20	1.39	0.96
	Experimental	3.24	6.21	2.67	0.96

Regarding the simple wound dressing skill, statistical analysis revealed that gender and prior dressing skill score were significantly different between the two groups before intervention ($p < 0.01$). However, after adjusting the gender and prior dressing skill score, the mean score of simple wound dressing before the intervention was not significantly different between the two groups ($p = 0.55$).

Also, the simple wound dressing skill score at baseline had a significant effect on its mean score after the intervention and its mean score change ($p < 0.01$). After adjusting the baseline mean score of simple wound dressing, the mean score of wound dressing skill after the intervention score and its mean score change in the experimental group were significantly higher than those of the control group ($p < 0.001$) (Tables 4 and 5).

Table 4. The result of ANCOVA related to the comparison of the mean score of wound dressing skills in students of the two groups after adjustment based on wound dressing skill baseline score, gender, and interest in the field.

Time	Source of changes	Sum of squares	Degree of freedom	Mean squares	F	Significance level
Before intervention	Gender	18.97	1	18.97	8.12	0.006
	Interest in the field	0.11	1	0.11	0.05	0.83
	Prior dressing skill score	16.46	1	16.46	19.35	<0.001
	Group	0.84	1	0.84	0.36	0.55
After intervention	Gender	0.04	1	0.04	0.04	0.84
	Interest in the field	0.40	1	0.40	0.47	0.49
	Prior dressing skill score	66.77	1	66.77	78.51	<0.001
	Group	23.78	1	23.78	27.96	<0.001
	Gender	0.04	1	0.04	0.04	0.84

Mean score changes	Interest in the field	0.40	1	0.40	0.47	0.49
	Group	23.78	1	23.78	27.96	<0.001

Table 5. Mean score of simple wound dressing skill before and after the intervention and its mean score change in study groups before and after adjustment based on the prior score of simple wound dressing skill, gender, and interest in the field.

Time	Group	Before adjustment		After adjustment	
		Mean	Standard deviation	Mean	Standard error
Before intervention	Control	7.73	1.49	7.44	0.28
	Experimental	6.89	1.71	7.18	0.28
After intervention	Control	7.49	1.15	7.35	0.17
	Experimental	8.58	0.94	8.71	0.17
Mean score change	Control	-0.24	1.33	0.05	0.17
	Experimental	1.69	1.47	1.40	0.17

Discussion

In this study, effort has been made to determine the effect of mental imagery practice on anxiety and wound dressing skills of nursing and midwifery students based on the PETTLEP model. With regard to the mean anxiety score before and after the intervention, as well as its mean difference, a statistically significant difference in the experimental and control groups was not observed.

Sarkhosh (2010), Ramezanali (2007), Skodzik, Adelt, Nossek, and Kuck (2018), Beizaee et al. (2018), Tayyari-Kalajahi et al. (2016) and Janinasab (2018) reported a significant relationship between these two variables. The difference in the field, type of skill and skill evaluation method are considered to be the reasons why the results of the above-mentioned studies are inconsistent with the present one. This study used the OSCE test to evaluate the skill level of students.

The OSCE test which is time-limited, uses a checklist to examine the students' skill and performance by an independent educator. Typically the test is multi-stationed, and it can comprehensively evaluate different types of skills and performance levels in standardized manner (Mojarrab, Bazrafkan, & Jaberi, 2020). Sheikh Abu Masoudi et al. (2015) and Bagheri et al. (2012)

showed the OSCE test is one of the most anxious tests in nursing students. Despite having theoretical knowledge, when students transform knowledge into skills in the OSCE, they may experience fear and anxiety (İnangil, Vural, Doğan, & Körpe, 2020). Some reasons for this can be the time limit, the number of stations and the direct presence of the evaluator (Adib-Hajbaghery & Yazdani, 2018). In addition, due to their unfamiliarity with its format and sequence, first-year nursing students, in particular, experience a significant level of stress and anxiety prior to the OSCE test (Mojarrab et al., 2020). Therefore, it can be construed that perhaps one of the reasons why students have not been able to reduce their level of anxiety by using PETTLEP mental imagery is the anxiety of the OSCE test itself; hence some changes to test seem necessary before students are evaluated by the OSCE. Then, strategies such as mental imagery should be taken into account to reduce the level of anxiety for the acquisition of a skill by students.

With regard to the students' skill of wound dressing, the statistical results indicated that after adjustment, the mean post-intervention score of dressing skill, as well as its mean score difference, was significantly higher in the experimental group than in the control group. For example, Wright et al. (2008) conducted a research with 56 students to investigate the effect of a PETTLEP-based mental imagery training program on the performance of nursing skills. According to their finding, a statistically significant difference was observed between the experimental and control groups ($p = 0.038$); the students in the experimental group achieved a higher score in terms of blood pressure measurement technique. Sanders et al. (2004), Butcher (1993), Sanders et al. (2008), Bramson et al. (2011), Afroozeh et al. (2013), Wright et al. (2007), Wright and Smith (2007), and Wright et al. (2014) reported a significantly positive relationship between mental imagery and the mean skill score of participants. However, in the study of Wright et al. (2008), with regard to the mean scores of students in performing aseptic skills ($p = 0.69$), there were no significant differences between experimental and control groups. The researchers believed that the PETTLEP technique which is based on neural firing and performance reminder and is regarded as a constant reminder of aseptic technique implementation method, may not be effective at one or another stage of the technique.

Because the PETTLEP mental imagery involves both physical and cognitive aspects of learning during practice, it culminates in maximum learning. As referred by McMorris (2004), imagery improves learning by activating the right hemisphere of the brain in terms of the information about our observations, senses and experiences. Moreover, imagery greatly contributes to preparing a person to put a well-acquired skill into practice. As required by this approach, one imagines his/her successful performance through mental practice. Hence, mental imagery enables a combination of learning and performance and hence facilitates maintenance of the action in memory as well as information retrieval from memory (Asareh, 2013). Cognitive scholars including Schmidt (1975), Magel (1976), Fitz and Posner (1976), and Bohan (1991) hold that mental imagery in the very outset of learning psychomotor skills assists the person in answering questions in their performance, despite ambiguities for the learner. At this stage, one tries to find answers for questions such as "What should I do?" "How should I perform the skill?", and "What is the next step?". Hence, using mental imagery helps the students to understand the movement patterns, and to review the symbolic components. It also facilitates codifying the movements necessary for a skill in the brain, and creating a movement plan in the central nervous system. Designing a model of the central nervous system as evidence for the efficacy of imagery in investigated by McMorris (2004). As he explains, learning by imagining an action is similar to its performance in actuality. Therefore, when an individual images a motor activity, s/he benefits from extra practice. However, a transition from the cognitive to motor stage seems very significant, as PETTLEP-based mental imagery equally entails both cognitive and motor factors besides being applicable in the initial and later phases of practice. The findings of this study amply corroborates the PETTLEP-based mental imagery model. As regards the fact that the PETTLEP-based mental imagery was just applied on a single psychomotor skill in nursing and midwifery students in the current study, we suggest an independent investigation on the simple and complex skill types for several psychomotor competences of students in other branches of medical sciences.

Conclusion

PETTLEP-based Mental imagery contributes to the development of wound dressing skills in students. Hence, it needs to be incorporated in the *Fundamentals of nursing* course for nursing and midwifery students.

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