FEATURE ARTICLE

CE 1.0 Contact Hour

A Prospective Observational Cross-Sectional Study Examining the Effect of Using Human Simulation and Moulages to Assist in Skin Cancer Education of Nursing Students

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ABSTRACT

Background: There has been a dramatic increase in the incidence of skin cancer; over 1 million new cases are diagnosed annually. Approximately one person dies from skin cancer per hour in this country. Nurses are in an excellent position to perform screenings for cancer, and skin cancer screenings should be taught in the nursing curriculum. The use of simulation increases knowledge and efficacy.

Methods: A cross-sectional study examining the use of moulages and simulation as an educational intervention on the knowledge of skin cancer, sun protective behaviors, and role of the nurse in skin cancer prevention in second-year nursing students enrolled in a baccalaureate nursing program.

Results: Students did not differ on baseline knowledge. However, the intervention group showed significant increased knowledge in all outcomes.

Conclusions: Increasing understanding of skin cancer with the use of moulages and simulation enhanced education and expertise in recognizing skin cancers.

Key words: Research, Nursing Education, Moulages, Human Simulation, Skin Cancer

As stated by the Centers for Disease Control and Prevention (CDC), skin cancer is a serious public health concern. Skin cancer is the most commonly diagnosed cancer in the United States with 5 million people treated each year at a cost of 8.1 billion dollars (CDC, 2015). Because skin cancer has reached epidemic proportions, the surgeon general established a call for action in the fight against skin cancer in 2014. The "Call to Action" presents the following five strategic goals to support skin cancer prevention in the United States: increase opportunities for sun protection in outdoor settings; provide individuals with the information they need to make informed, healthy choices about ultraviolet (UV) radiation exposure; promote policies that advance the national goal of preventing skin cancer; reduce harms from indoor tanning; and strengthen research, surveillance, monitoring, and evaluation related to skin cancer prevention (U.S. Department of Health and Human Services, 2014). If nurses are knowledgeable about skin cancer, they can assist in reducing the incidence of skin cancer. Therefore,

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it is important to determine the optimal method for teaching nursing students to recognize benign and cancerous skin lesions in the learning laboratory via the use of moulages, which are molds of various moles.

REVIEW OF LITERATURE

UV exposure, whether from natural sunlight or tanning beds, increases the risk of skin cancer. Sun protective behaviors are beneficial in reducing the risk of skin cancer if utilized consistently. According to the World Health Organization (WHO), there has been a rise in the incidence of skin cancer and experts believe that four of five cases of skin cancer could be prevented by utilizing sun protective behaviors (WHO, 2015). Saridi, Bourdaki, and Rekleiti (2014) found in a systematic review that the incidence of malignant melanoma cases along with other skin cancers is increasing in younger ages (Saridi et al., 2014). It is evident that continued education for healthcare providers, students, and the community at large is necessary in the endeavor of reducing the epidemic of skin cancer.

Numerous studies have documented that the use of indoor tanning devices poses significant short- and long-term health risks ranging from minor sunburns to potentially fatal disorders (Driscoll & Darcy, 2015). Tanning bed use greatly increases the risk of skin cancer (Cooley & Quale, 2013). Legislation has been passed in some states banning the use of tanning beds by children and adolescents. Despite the passage of statutes regulating the use of tanning beds, the rates at which adolescents have reported the use of tanning devices have not been reduced (Driscoll & Darcy, 2015). The WHO recognizes the dangers of artificial tanning and exposure to sunlamps, and they declare that no person under 18 years old should use a tanning bed (WHO, 2015). All nurses can be proactive in addressing this issue with patients and their families. Advocating the avoidance of tanning bed use when educating nursing students will engrain the importance of this vital UV protection behavior.

Nurse researcher Kubrik, along with her team, studied the value of teaching undergraduate nursing students about skin cancer during their physical assessment classes using simulation. This research used 104 student participants who were divided into three or four subgroups so each student could practice 1:1 on a mannequin. The SIM mannequin had moles of varying sizes, colors, and borders. Four separate debriefing sessions were held, and additional data were collected using a survey instrument. Results indicated that the students felt more confident in identifying suspicious moles and were also more aware of the dangers of the sun and stated that they would be more willing to adhere to sun protective behaviors (Kuhrik, Seckman, Kuhrik, Ahearn, & Ercole, 2011).

Another study examined 101 nursing students with the use of case-based learning and simulation. The intervention group in this study had significantly higher scores on patient assessment, patient evaluation, and appropriate nursing interventions than did the control group (Raurell-Torreda et al., 2015). These researchers found educational value in teaching physical assessment through the use of case-based learning and simulation.

A study consisting of 1,178 nursing students in Turkey was conducted to determine the skin cancer knowledge and sun protective behaviors among nursing students, and the findings suggest that it is important for nursing students to acquire knowledge and behavior for protection against skin cancers (Yilmaz et al., 2015). Nursing students learn about the disease process, risk factors, physical assessment, and educating patients. Using creative teaching methods including human simulation, skin moulages, and role playing can combine the knowledge gained as nursing students and be developed in professional nursing practice.

Significance of the Study

Nurses can participate in the call for action against skin cancer by examining their patients and educating the community about sun protective behaviors and skin cancer. Nurses evaluate the skin of all patients admitted to hospitals. Therefore, they are in an ideal position to educate patients about skin cancer, recognize skin lesions, and refer the patients to the physician for treatment (Siegel, 2012).

Objectives of the Study

The objective of this study was to examine the effect of human simulation and the use of moulages in educating second-year baccalaureate nursing students' knowledge of skin cancer, sun protective behaviors, and role of the nurse in skin cancer prevention. The prespecified hypothesis is that students exposed to the moulage educational intervention will show increased gains in skin cancer knowledge, sun protective behaviors, and role of the nurse in skin cancer prevention over the control group students.

METHODOLOGY: STUDY DESIGN AND SETTING

This was a prospective, cross-sectional, quasi-experimental, pretest-and-posttest design study using a convenience sample of six sophomore nursing classes in a baccalaureate program located in suburban New York. The students were consented during the third and fourth weeks of the spring semester in 2015. Exposure to educational intervention was one lecture class and one laboratory class for the intervention groups and traditional curricula in "Fundamental of Nursing" for the control groups. Data of preintervention and postintervention knowledge were collected immediately before and after intervention, respectively.

Participants and Procedure

This study involved all of the students in the sophomore class. Each class had approximately 30 students enrolled. Two of the classes were randomly designated as control groups. The control groups received the traditional curriculum on skin cancer. Those students received the pretest and posttest only. Every student in each of the six selected classes was eligible for inclusion in the study. Before

TABLE 1. Cronbach's Alpha Statistic for Interitem Reliability of Scale and Subscales

Scale	Cronbach's	*n* of Items	Mean Interitem Correlation
Total	.876	39	.163
Knowledge	.748	17	.154
Behavior	.752	9	.259
Role	.844	13	.297

obtaining signed informed consent, the students were informed that their participation in the study was voluntary and that they may withdraw at any time. No students declined to participate. To preserve confidentiality, the surveys would only be seen by the researcher and research assistants. The surveys were confidential, and ID codes were used to protect the identity of participants.

The four intervention nursing classes received the pretest, followed by viewing a vimeo (a digitalized lecture) by the researcher on the role of the nurse in skin cancer prevention. Then, the students were brought to the learning laboratory where two students acted as patients with skin lesions. The student actors were given scripts to follow and had the skin moulages on their arms and legs. The rest of the class came into the laboratory two at a time to assess the student actors. The students were expected to identify the lesions and teach about sun protective behaviors according to the CDC guidelines (CDC, 2014). Finally, the students took the posttest.

Variables of Interest and Statistical Methods

The primary outcome variables of interest were student knowledge of skin cancer, sun protective behaviors, and role of the nurse in skin cancer prevention. These were measured via pretests and posttests composed of 39 items and three demographic questions developed by Siegel (2010). The measures have shown interitem reliability with a Cronbach's alpha statistic of .747–.891 in studies of similar populations of nursing students (Siegel, 2010, 2016). The test consisted of 17 items of skin cancer knowledge, nine items of sun protective behavior knowledge, and finally, 13 items of the role of the nurse in skin cancer prevention. The items were of Likert type, with a discrete range of responses from 1 through 5 representing "strongly disagree" to "strongly agree" scored items. The tests were taken preintervention and postintervention, with subscores for each area and total scores computed after Cronbach's alpha coefficients on subconstructs, and total instrument estimates were obtained. Primary outcome scores were compared using analysis of covariance to control for any prescore nonequivalence of groups.

In an attempt to address potential bias inherent in an observational study, demographic data of participants (e.g., class, instructor, gender, age, and race) were also collected to compare potential nonequivalence of the groups due to nonrandom treatment assignment of students. However, the classes were randomly assigned. Demographic data between groups were compared with descriptive statistics, with measures of central tendency (mean, proportion) and dispersion (e.g., standard deviations, 95% confidence intervals) reported. Demographic data were then compared between groups with estimates of inferential statistics (independent sample *t* tests for continuous outcome measures, and chi-square statistic estimations for discrete outcome measures). Data were evaluated for missing data with a plan for listwise deletion of missing-at-random data

TABLE 2. Distribution of Covariates in Sample

Demographic	Experimental Group (*n* = 97)		Control Group (*n* = 55)		*p* Value[a]
	Mean or Count	*SD* or Percentage	Mean or Count	*SD* or Percentage	
Gender (female)	88	(91%)	48	(87%)	.51
Age group, years					.43
18–30	86	(89%)	52	(95%)	
31–40	10	(10%)	3	(5%)	
41–50	1	(1%)	0	(0%)	
Race					.15
White/non-Hispanic	42	(45%)	35	(66%)	
Black	23	(25%)	9	(17%)	
Hispanic	19	(20%)	5	(9%)	
Asian/Pacific Islander	6	(6%)	3	(6%)	
Other	4	(4%)	1	(2%)	

Note. Mean and *SD* are only reported on continuous variables.
[a]*p* Values are based on chi-square tests of significance for discrete variables and independent sample *t* test for continuous variables.

TABLE 3. Analysis of Covariance for Knowledge Scores

Source	Sum of Squares	*df*	Mean Square	*F*	Partial Eta Squared
Pretest	2510.87	1	2510.87	46.01*	.38
Group	2524.44	1	2524.44	128.68*	.38
Error	4048.76	122	33.19		

*$p < .001$.

TABLE 5. Analysis of Covariance for Role Scores

Source	Sum of Squares	*df*	Mean Square	*F*	Partial Eta Squared
Pretest	414.29	1	414.29	23.73*	.16
Group	2320.79	1	2320.79	132.95*	.52
Error	2129.69	122	17.46		

*$p < .001$.

followed by a sensitivity analysis of comparing leaving the subjects with missing data in results to listwise deletion.

RESULTS

All of the students consented to participate in the research. There were 156 participants who completed the pretests; 97 students enrolled in the treatment group and 55 participants enrolled in the control group completed the posttest. This resulted in a 97% completion rate. Of the data per participant, missing data were found in less than 1% of the participants and to be missing at random.

Descriptive Data and Group Equivalence

The interitem reliability estimates were acceptable for subscales and the overall tool (Table 1).

The control and experimental groups were comparable on each observed covariate (Table 2).

As the groups were assessed to be similar enough for comparison, we proceeded with testing the primary outcome of interest: the effect of moulage education on knowledge of skin cancer, sun protective behaviors, and role of the nurse in education between groups. The unadjusted baseline mean comparisons between groups were not significantly different on knowledge ($p = .902$), behaviors ($p = .564$), or roles ($p = .785$).

There was a statistically significant effect of the educational intervention and pretest scores on posttest scores for each primary outcome: knowledge, $F(1, 122) = 128.68$, $p \leq .001$, and $F(1, 122) = 46.01$, $p \leq .001$; behaviors, $F(1, 132) = 84.66$, $p \leq .001$, and $F(1, 132) = 37.12$, $p \leq .001$; and roles, $F(1, 122) = 132.95$, $p \leq .001$, and $F(1, 122) = 23.73$, $p \leq .001$ (Tables 3–5).

TABLE 4. Analysis of Covariance for Behavior Scores

Source	Sum of Squares	*df*	Mean Square	*F*	Partial Eta Squared
Pretest	278.65	1	278.65	37.12*	.22
Group	635.50	1	635.50	84.66*	.39
Error	990.87	132	7.51		

*$p < .001$.

DISCUSSION

Teaching students about skin cancer, sun protective behaviors, and the nurse's role in assessing and educating patients using moulages and simulation was determined to be a superior method of teaching students as compared with the traditional curriculum.

Limitations

There were limitations to this pilot study. The study design was observational, with assignment to treatment being at class level rather than at student level, which limits causal inference because of lack of random assignment to treatment. In addition, the sample was a convenience sample without random selection into the study sample, again limiting causal inference from the study. The Cronbach's alphas were acceptable for a pilot instrument (>.70). There was no delayed testing, which limited inference about the educational intervention's effect on sustained learning. Furthermore, the sample may not be generalizable to all other nursing student populations within the United States.

CONCLUSION

This pilot study shows the effectiveness of using human simulation with moulages in addition to the Socratic teaching method using a vimeo. Students in the intervention groups learned how to identify skin lesions and conduct patient teaching using the CDC guidelines of sun protective behaviors. These methods also strengthened the physical assessment and decision-making skills of the nursing students. This was determined to be a superior method of teaching the students as the intervention groups had significance in the areas of behavior, knowledge, and role. Therefore, faculty can use these teaching methodologies to benefit students. ■

REFERENCES

Centers for Disease Control and Prevention. (2014). *Sun safety*. Retrieved from http://www.cdc.gov/cancer/skin/basic_info/sun-safety.htm

Centers for Disease Control and Prevention. (2015). *Skin cancer quick facts*. Retrieved from http://www.cdc.gov/cancer/skin/pdf/quick-facts.pdf

Cooley, J. H., & Quale, L. M. (2013). Skin cancer preventive behavior and sun protection recommendations. *Seminars in Oncology Nursing*, *29*(3), 223–226. doi:10.1016/j.soncn.2013.06.008

Driscoll, D. W., & Darcy, J. (2015). Indoor tanning legislation: Shaping policy and nursing practice. *Pediatric Nursing*, *41*(2), 59–88.

Kuhrik, M., Seckman, C., Kuhrik, N., Ahearn, T., & Ercole, P. (2011). Bringing skin assessments to life using human patient simulation: An emphasis on cancer prevention and early detection. *Journal of Cancer Education*, *26*, 687–693.

Raurell-Torreda, M., Olivet-Pujol, J., Romero-Collado, A., Malagon-Aguilera, M.C., Patino-Maso, J., & Baltasar-Brague, A. (2015). Case-based learning and simulation: Useful tools to enhance nurses' education? Nonrandomized control trial. *Journal of Nursing Scholarship*, *47*(1), 34–42. doi:10.1111/jnu.12113

Saridi, M., Bourdaki, E., & Rekleiti, M. (2014). Young student's knowledge about sun protection and its relation with sunburn incidence. A systemic review. *Health Science Journal*, *8*(1), 4–21.

Siegel, V. (2010). Exploring the role of the nurse in skin cancer prevention. *Dermatology Nursing*, *22*(6), 18–22.

Siegel, V. (2012). Adding patient education of skin cancer and sun-protective behaviors to the skin assessment screening on admissions to hospitals. *Medsurg Nursing*, *21*(3), 183–184.

Siegel, V. (2016). Teaching Nursing Students about Skin Cancer Using a Skin Analyzer Machine. *MEDSURG Nursing*, *25*(2), 117–119.

U.S. Department of Health and Human Services. (2014). *Surgeon General's call to action.* Retrieved from http://www.surgeongeneral.gov/library/calls/prevent-skin-cancer/exec-summary.html

World Health Organization. (2015). *Skin cancers*. Retrieved from http://www.who.int/uv/faq/skincancer/en/index1.html

Yilmaz, M., Yavuz, B., Subasi, M., Kartal, A., Celebioglu, A., Kacar, H., … Altiparmak, S. (2015). Skin cancer knowledge and sun protection behavior among nursing students. *Japan Journal of Nursing Science*, *12*(1), 69–78.

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