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Official Study Title: The Effect of Simulation-Based Learning Experiences on Nursing Students' Knowledge, Skills and Self-Efficacy Levels in Teaching Postmortem Care

NCT Number: Not yet assigned

Document Title: Study Protocol

Document Date: 12 August 2025

Study Protocol

PURPOSE AND TYPE OF THE STUDY

This study is planned as a randomized controlled experimental design to investigate the effect of simulation-based learning experiences in the teaching of postmortem care on the knowledge, skills, and self-efficacy levels of nursing students. In this context, the CONSORT 2025 principles (Consolidated Standards of Reporting Trials) will be followed in the design and implementation of the study.

HYPOTHESES OF THE STUDY

Hypothesis 1 (H1): The postmortem care knowledge levels of students who experience simulation-based learning are higher compared to those using traditional methods. Hypothesis 2 (H2): The postmortem care skill levels of students who experience simulation-based learning are higher compared to those using traditional methods. Hypothesis 3 (H3): The end-of-life and postmortem care self-efficacy levels of students who experience simulation-based learning are higher compared to those using traditional methods. Additionally, it is expected that students who experience simulation-based learning will have higher levels of student satisfaction and self-confidence in learning.

VARIABLES OF THE STUDY

Independent Variables of the Study:

- Demographic characteristics of the students

Dependent Variables of the Study:

- Postmortem care knowledge assessment test scores of the students
- Postmortem care simulation skill checklist scores of the students
- Mean scores obtained by the students from the End-of-Life and Postmortem Care Self-Efficacy Scale
- Levels of satisfaction with learning among students in postmortem care simulation education
- Levels of self-confidence in learning among students in postmortem care simulation education

- Mean scores obtained by the students from the Simulation Design Scale regarding postmortem care

PLACE AND TIME OF THE STUDY

The study is planned to be conducted during the 2025-2026 academic year at the Acıbadem University Center of Advanced Simulation and Education (CASE). The Acıbadem University Center of Advanced Simulation and Education holds a Center of Excellence certification from the Canadian Aviation Electronics Academy (CAE). Additionally, this center, accredited by the Network of Accredited Clinical Skills Centers of Europe (NASCE) and the Society for Simulation in Healthcare (SSH), which evaluates clinical skills centers in Europe, adheres to international standards in simulation-based education.

UNIVERSE AND SAMPLE OF THE STUDY

Universe of the Study

The universe of the study will consist of fourth-year nursing students enrolled in the Faculty of Health Sciences, Department of Nursing, Acıbadem University during the 2025-2026 academic year.

Sample of the Study

The sample of the study will comprise fourth-year students who agree to participate and meet the inclusion criteria. The sample size was determined based on a power analysis (G*Power 3.1.9.7) using data from a similar study (Alwawi & İnkaya, 2022) with an independent t-test sample calculation, resulting in a test power of 0.99, 99% confidence (1-α), and an effect size of f=1.02, requiring a minimum of 31 participants per group, totaling 62. To account for potential sample loss, an additional 10% of the sample will be included, planning for 34 participants per group, resulting in a total of 68 participants.

Randomization in the Study: The allocation of students included in the study to either the experimental or control group will be determined using the simple randomization method via the Random Allocation Software program.

Inclusion Criteria

- Being literate in Turkish

- Being 18 years of age or older
- Having no history or presence of psychiatric disorders/illnesses, not receiving psychiatric treatment, and not using psychiatric medication
- Having not previously received education or training on postmortem care
- Having not previously provided postmortem care

Exclusion Criteria

- Having lost a close relative within the last year

DATA COLLECTION TOOLS

Data will be collected using the "Demographic Characteristics Form," "Postmortem Care Knowledge Assessment Test for Nursing Students (PCKATNS)," "Postmortem Care Simulation Checklist (PCSC)," "End-of-Life and Postmortem Care Self-Efficacy Scale for Nursing Students (ELPMCSESN)," "Student Satisfaction and Self-Confidence in Learning Scale," and "Simulation Design Scale."

Demographic Characteristics Form

The Demographic Characteristics Form, prepared by the researchers based on the literatüre, consists of a total of 12 questions. The form includes socio-demographic data such as the students' age and gender, academic performance (general academic grade point average-GPA), familiarity with simulation applications, experiences with postmortem care knowledge/skills, previous experience of loss, the timing of any loss if experienced, their perception of adequacy in supporting family members, and their opinion on the effectiveness of using simulation-based learning methods. The form also includes three questions related to exclusion criteria: experiencing a close loss within the last year, having previously provided postmortem care, and having participated in education or training on end-of-life care or death. Additionally, students will be asked to indicate their perceived level of adequacy in providing postmortem care on a Visual Analog Scale ranging from 0 to 10.

Postmortem Care Knowledge Test for Nursing Students

The Postmortem Care Knowledge Test for Nursing Students (PCKTNS) is a multiple-choice test with five options and 25 questions, developed by the researchers based on the

literatüre and aligned with the content of the theoretical education. Each question in the knowledge test is worth four (4) points. The total score obtainable from the test ranges from 0 to 100. The average completion time for the test is 30 minutes. An increase in the score indicates a higher level of postmortem care knowledge, while a decrease indicates a lower level. This test will be administered as a pre-test to students in both the experimental and control groups before the theoretical education. The Postmortem Care Knowledge Test for Nursing Students will be submitted to expert opinion by the researchers.

Postmortem Care Simulation Skill Checklist

The Postmortem Care Simulation Skill Checklist is designed by the researchers based on the literatüre and tailored to the simulation scenario to evaluate the psychomotor skills and teamwork of students in applying postmortem care following simulation-based education. The checklist includes application steps related to postmortem care and allows the researcher to assess whether students perform the relevant steps. The checklist contains 27 application steps expected from the student. Each step is scored as "Performed: 1 point," "Partially Performed: 0.5 points," and "Not Performed: 0 points" based on the execution of the skill. The maximum total score obtainable from the Postmortem Care Simulation Checklist is 27, and the minimum total score is 0. An increase in the student's score on the checklist is considered to indicate a higher level of performance in postmortem care application steps. The Postmortem Care Simulation Skill Checklist will be submitted to expert opinion by the researchers for evaluation of its appropriateness.

End-of-Life and Postmortem Care Self-Efficacy Scale for Nursing Students

The End-of-Life and Postmortem Care Self-Efficacy Scale for Nursing Students, developed by Conley in 2023 to assess nursing students' self-efficacy in end-of-life and postmortem care, underwent a Turkish validity and reliability study by Kovancı, Bilgin, and Öcalan in 2024. The original scale consists of 18 items and is a visual analog scale. Participants can rate each item on the scale from 0 (no confidence) to 100 (high confidence). The mean score obtained from the scale indicates the self-efficacy level. A mean score of 90-100 is interpreted as very high, 80-89 as high, 70-79 as moderate, 60-69 as low, and 59 or below as very low self-efficacy. The Cronbach's alpha coefficient of the original scale was found to be 0.93. The Turkish validity and reliability study determined the Cronbach's alpha coefficient as 0.90.

Student Satisfaction and Self-Confidence in Learning Scale

The Student Satisfaction and Self-Confidence in Learning Scale, developed by Jeffries and Rizzolo in 2006 with 13 items to measure students' satisfaction with simulation activities and their self-confidence in learning, underwent a Turkish validity and reliability study by Ünver et al. in 2017 and was revised to 12 items. The scale items are evaluated on a five-point Likert scale and consist of two sub-dimensions. The first sub-dimension, "Satisfaction with Current Learning," includes five items, and the second sub-dimension, "Self-Confidence in Learning," includes seven items. The total Cronbach's Alpha coefficient of the scale is 0.89. The Cronbach's Alpha coefficients of the sub-dimensions are 0.85 and 0.77, respectively. An increase in the total score obtained from the scale indicates a higher level of student satisfaction and self-confidence in learning.

Simulation Design Scale

The Simulation Design Scale, developed by Jeffries and Rizzolo in 2006, underwent a Turkish validity and reliability study by Ünver et al. in 2017. The scale consists of five sub-dimensions—Objectives and Information (5 items), Support (4 items), Problem Solving (5 items), Feedback/Guided Reflection (4 items), and Degree of Realism/Fidelity (2 items)—and a total of 20 items. The total Cronbach's Alpha coefficient of the scale is 0.90, with sub-dimension Cronbach's Alpha coefficients of 0.77, 0.73, 0.76, 0.75, and 0.86, respectively. The scale is evaluated in two sections. The first section assesses whether the best simulation design elements are implemented in the simulation activity, while the second section evaluates the degree of importance students attribute to these design elements. The first section is rated as "Strongly Disagree," "Disagree," "Neutral," "Agree," "Strongly Agree," and "Not Applicable." The second section is rated as "Not Important," "Somewhat Important," "Neutral," "Important," and "Very Important." Scale scores are calculated by dividing the total of the overall and sub-dimension scores by the number of items. An increase in the score in the first section indicates the presence of the best simulation design elements in the activity, while an increase in the score in the second section indicates a higher level of importance attributed by students to the simulation.

RESEARCH PROCESS

First Stage

Preparation Phase:

The "Demographic Characteristics Form," "Postmortem Care Knowledge Assessment Test for Nursing Students (PCKATNS)," and "Postmortem Care Simulation Checklist (PCSC)" data collection tools, as well as the postmortem care simulation scenarios (teaching scenario and evaluation scenario) prepared by the researcher, will be submitted for expert opinion. Expert opinions will be evaluated using the Content Validity Index (CVI) as recommended in the literatüre.

Permission to use the "End-of-Life and Postmortem Care Self-Efficacy Scale for Nursing Students (ELPMCSESN)," "Student Satisfaction and Self-Confidence in Learning Scale," and "Simulation Design Scale" data collection tools will be obtained from the authors. The study will be conducted as a Randomized Controlled Trial (RCT), and following the approval of the ethics committee, it will be registered at https://clinicaltrials.gov/.

To teach postmortem care application to participants in the experimental and control groups and to reinforce the content of the theoretical education, a "Postmortem Care Skills Video" will be prepared by the researcher as an educational material. This video will be submitted for expert opinion.

In the study, which includes fourth-year nursing students as the sample group, a "Scenario Case Video" (including the patient’s history and current condition) related to a deceased individual will be prepared to help students understand the narrative before being included in the postmortem care simulation scenario. This video will depict the health history of the individual immediately before their death and indicate that the individual is in their final minutes before death. The Scenario Case Video will begin with a nurse entering the room to administer nursing interventions for respiratory activity to an individual exhibiting dyspnea and apnea symptoms (oxygen therapy will be applied via a reservoir mask from the central oxygen system at 15 L/min). During the nurse’s care application, the patient will show apnea periods, followed by the development of respiratory arrest, prompting a blue code to be called. The video will end with the blue code team entering the patient’s room with an emergency cart. This video will be shown to students in the experimental group before the teaching simulation and to students in both the experimental and control groups before the evaluation simulation. Following the video, students will be taken to the postmortem care simulation scenario in pairs.

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Postmortem Care Simulation Scenario

The simulation is planned in three stages: pre-briefing (orientation), simulation implementation, and debriefing (reflection) sessions. The scenario content has been developed based on the best practice standards published by the International Nursing Association for Clinical Simulation and Learning (INACSL), considering simulation design criteria.
The Postmortem Care Simulation Scenario has been prepared by the researchers based on relevant literatüre and aligned with simulation learning objectives (performing physical postmortem care on a deceased individual, establishing effective communication with the team and family members during postmortem care, creating an appropriate environment for family members to say goodbye after postmortem care during the grieving process, accurately documenting postmortem nursing care, and coordinating the deceased individual's transfer to the morgue). The scenario is planned to last approximately 20 minutes.
High-fidelity simulation design optimizes learning outcomes by mimicking real clinical environments through three core parameters: conceptual, physical, and psychological realism. Conceptual realism refers to the alignment of the scenario with theoretical and clinical reality, incorporating real clinical contexts and logically connecting to learning objectives. In this study, conceptual realism will be achieved through the clinical and theoretical appropriateness of the postmortem care simulation scenario. Physical realism involves the simulation environment and tools visually, audibly, and tactilely reflecting the clinical setting. In this study, physical realism will be ensured by arranging the environment (palliative care clinic-patient room, quiet and serene setting, a photograph of the patient and family at the bedside, prayer beads, a prayer book, syringes, ampules, sponges scattered on the floor after CPR, blood stains dripping from the patient's arm onto the bed and floor, a patient file on the nightstand with a death report and a morgue transfer form to be filled out by nurses) and applying a postmortem moulage to a high-fidelity mannequin (pale-yellow skin, sweaty forehead and chest, dark circles under the eyes, cyanotic lips and earlobes, open eyes, dentures removed during intubation placed on the nightstand, a wedding ring, nasogastric tube (NGT), IV catheters (18 Gauge) in both arms, defibrillator pads on the chest, urinary catheter, anti-embolic stockings, a Biatain dressing for a stage-4 pressure ulcer on the sacrum, fecal incontinence due to sphincter relaxation). Psychological realism reflects participants' emotional and professional responses specific to real clinical situations. In this study, psychological realism will be achieved in the postmortem care simulation through the case video to engage participants emotionally and foster a

connection with the scenario, as well as through teamwork and an empathetic, emotional approach to a family member (the daughter) during the grieving process. Additionally, to enhance the physical realism of the simulation, a review article titled "Postmortem Care Simulation Moulage Algorithm: A Way to Enhance Realism" will be prepared to develop a postmortem moulage algorithm for the high-fidelity simulated mannequin. This algorithm will later be used in the study's simulation scenario.

Second Stage

Implementation Phase:

During the implementation phase of the study, the research design template outlined below will be followed. The study will commence after obtaining the necessary ethics committee and institutional permissions.

Following the expert opinions on the Postmortem Care Simulation Scenarios, a pilot study will be conducted with a group of students representing the sample.

The participants in both the experimental and control groups will be administered the "Informed Consent Form," "Demographic Characteristics Form," "Postmortem Care Knowledge Test for Nursing Students (PCKTNS)," and "End-of-Life and Postmortem Care Self-Efficacy Scale for Nursing Students (ELPMCSESN)" prior to the theoretical education. Following the pre-tests, it is planned to provide theoretical education for approximately 4 class hours (with each class hour lasting 45 minutes). The first 2 hours of the theoretical education will cover topics related to Death and General Aspects of Death, while the remaining 2 class hours will be delivered as a PowerPoint presentation focusing on postmortem care application content.

Following the theoretical education, both the experimental and control groups will be shown the "Postmortem Care Skills Video." Additionally, prior to the teaching simulation for postmortem care, the experimental group will be shown the "Scenario Case Video," after which the scenario prepared for the teaching simulation will be implemented. At this stage, no intervention will be applied to the control group. Four weeks after the learning simulation administered to the experimental group, participants from both the experimental and control groups will be taken to the evaluation simulation in pairs. Prior to the postmortem care evaluation simulation, students from both the experimental and control groups will be shown the "Scenario Case Video," followed by the application of the scenario prepared for the evaluation simulation. At this stage, participants will be evaluated according to the

"Postmortem Care Simulation Checklist." Following the evaluation simulation, the students will be administered the "Postmortem Care Knowledge Test for Nursing Students (PCKTNS)," the "End-of-Life and Postmortem Care Self-Efficacy Scale for Nursing Students (ELPMCSESN)," the "Student Satisfaction and Self-Confidence in Learning Scale," and the "Simulation Design Scale.

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NCT Number:
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Document Title:
Statistical Analysis Plan

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Statistical Analysis Plan

Data Analysis:

The data will be analyzed using the SPSS 25.0 software package, and statistical significance will be evaluated at a $p<0.05$ level. In evaluating the study findings, descriptive statistical methods (mean, standard deviation, median, frequency, percentage, minimum, maximum) will be used, alongside determining the normality of parameters with Shapiro-Wilk and Kolmogorov-Smirnov tests. For pairwise comparisons of parameters showing normal distribution, an independent t-test will be used; for parameters not showing normal distribution, Mann-Whitney U test and Kruskal-Wallis variance analysis will be applied. To assess the relationship between variables, Pearson correlation analysis will be used for those showing normal distribution, while Spearman Rho correlation analysis will be applied for those not showing normal distribution. Analysis of variance for repeated measures will be utilized for repeated measurements.

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NCT Number:
Not yet assigned

Document Title:
Informed Consent Form

Document Date: 12 August 2025

12.08.2025

INFORMED CONSENT FORM FOR VOLUNTARY PARTICIPATION IN THE STUDY

This research is a doctoral thesis study titled "The Effect of Simulation-Based Learning Experiences in the Teaching of Postmortem Care on the Knowledge, Skills, and Self-Efficacy Levels of Nursing Students," conducted by [Ozan ACAR], a doctoral student in the Fundamentals of Nursing Program at the Istanbul University-Cerrahpaşa Graduate Education Institute, under the supervision of Assoc. Prof. Dr. Aylin ÖZAKGÜL. This form has been prepared to inform you about the research conditions and to obtain your consent for voluntary participation.

What is the Purpose of the Study?

This research aims to determine the effect of simulation-based learning experiences in the teaching of postmortem care on the knowledge, skills, and self-efficacy levels of nursing students.

What Do We Expect from You?

If you agree to participate voluntarily in the study, you will be asked to respond to the questions in the demographic characteristics form and the scales related to the subject. Additionally, your participation in the theoretical education session on postmortem care and your performance of simulation applications aligned with scenario objectives are expected. This process has been designed to contribute to your professional development.

How Will We Use the Information We Collect?

Your participation is entirely based on voluntariness. In the research, your personal data will be kept confidential and will only be evaluated by the researcher for scientific purposes. The information you provide will not be linked to your identity and will only be analyzed in aggregate form. The data obtained may be used in the doctoral thesis and scientific publications. During the research, no information that is disturbing or unlawful will be requested from you in any way.

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Things You Need to Know About Participation:

- This research is not suitable for individuals who have lost a close relative within the last year. (Please contact the researcher.)
- Responses to the demographic characteristics form and scales will be processed in accordance with the Personal Data Protection Law No. 6698 (KVKK) and relevant legislation, adhering to confidentiality principles. The data obtained will be anonymized and will not contain any information that identifies your personal details. The data will not be shared with third parties and will only be used, presented, and published for the scientific purposes of this study. Furthermore, compliance with KVKK legislation and ethical principles in scientific research will be meticulously ensured at every stage of the research process.
- The data obtained during the study will be securely stored, respecting confidentiality and data security principles. The data will be retained for 5 years as required by scientific ethics committees and will then be destroyed using appropriate methods.
- You have the right to withdraw your participation at any point during the study; this decision will not result in any negative consequences.
- The research is being conducted with the approval of the Acıbadem University and Acıbadem Health Institutions Medical Research Ethics Committee (ATADEK).

For More Information:

If you wish to obtain detailed information about the research, you can contact us using the following contact details:

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Consent:

I have read the information above and agree to participate in this research entirely on a voluntary basis.

Name-Surname	**Date**	**Signature**
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* Please complete and sign the form, then submit it to the researcher.