

# Effectiveness of Virtual Reality Simulation-Based Training on Enhancing Positive Attitudes toward Newborn Skin Assessment among Neonatal ICU Nurses

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## ABSTRACT

**BACKGROUND:** Maintenance of skin integrity in the neonatal period is crucial to avoid morbidity and mortality associated with skin problems in infants admitted to the neonatal ICUs (NICUs). Neonatal ICU nurses play a key role in the assessment of newborn skin for the early detection and management of skin injury. Consequently, there is a need to foster positive attitudes toward newborn skin assessment among nurses through training to reduce the incidence of skin injury.

**OBJECTIVE:** To examine the effect of virtual reality simulator (VRS)-based training on the attitude toward newborn skin assessment among NICU nurses.

**METHODS:** The study had a quasi-experimental design, involving pretest/posttest comparisons. A total of 73 NICU nurses (training group, n = 33; control group, n = 40) working in public and private hospitals in Gaziantep, Turkey, were included in the study, which was conducted from March to May 2022. Data were collected using the Sociodemographic and Occupational Data Form and the Newborn Skin Assessment Attitude Scale (NSAAS). The nurses in the training group received a VRS training program that was developed based on the theory of attitude change known as the Message-Learning Approach. The control group did not receive any training.

**RESULTS:** Intragroup and between-group comparisons of the pretest and posttest scores of the NSAAS subdimensions (awareness, practice, and avoidance) and total scores after training showed that all subdimension scores and total NSAAS scores improved significantly in the training group.

**CONCLUSIONS:** The VRS training was effective in enhancing or reinforcing positive attitudes toward newborn skin assessment among NICU nurses.

**KEYWORDS:** attitude, neonatal intensive care, newborn, nurse, skin assessment, virtual reality simulation

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## INTRODUCTION

Newborn skin differs significantly from adult skin both structurally and functionally. Fragility of the epidermis is marked in preterm infants because of incomplete maturation of the skin barrier. Preterm birth is defined as any birth before 37 weeks of pregnancy, and the skin of preterm infants is immature compared with those born at term.<sup>1–3</sup> Thus, use and removal of adhesives on newborn skin require particular care, especially in preterm newborns. Maintaining the integrity of the skin during the critical newborn period is essential,

because factors such as dermatitis, pressure injury (PI), burns, and trauma can impair the barrier function of the skin.<sup>4</sup>

The practices performed in neonatal ICU (NICU) include invasive procedures, use of topical antiseptic solutions, maintaining the humidity and temperature of the environment in the newborn position, body care, and attachment and/or removal of devices for hemodynamic monitoring and life support, all of which predispose newborns to cutaneous lesions.<sup>5</sup> The most frequent lesions include diaper dermatitis, edema, erythema, infiltration, ecchymosis, and desquamation. Therefore, newborn skin should be evaluated on a regular basis to avoid morbidity and mortality associated with skin injury.

Assessment of potential risks and implementation of appropriate preventive measures starting from the admission of the newborn to the NICU can reduce morbidity and mortality and favorably affect the healing process. Routine skin assessment shortens the recovery time by minimizing potential skin problems and enables prompt diagnosis and treatment. Delays in recovery can cause prolonged hospitalization of the newborn and pose financial burden, both of which are devastating for the parents.<sup>6,7</sup>

Neonatal ICU nurses play a key role in newborn skin assessment and care. Despite the availability of internationally accepted, evidence-based scales for the assessment of newborn skin such as the Neonatal Skin Risk Assessment Scale, a significant reduction in the prevalence of skin injuries has not yet been achieved. Negative attitudes toward skin assessment among nurses may result in reluctance to use skin assessment guidelines. Nurses' attitudes toward assessment of newborn skin provide a clue for understanding their behavioral tendencies to adopt or avoid the skin evaluation process. Therefore, attitudes of neonatal nurses toward neonatal skin assessment are crucial for prevention and/or treatment of newborn skin problems and associated complications in an early stage.<sup>8</sup> To gain an understanding of the attitudes of NICU nurses toward newborn skin assessment, the Newborn Skin Assessment Attitude Scale (NSAAS) for use by NICU RNs has been developed and validated by the authors and published elsewhere.<sup>1</sup>

The word *attitude* is derived from the Latin “aptus,” which means “fit and ready for action.” To date, the notion of attitude has been conceptualized in various ways based on different theoretical approaches.<sup>9–11</sup> Attitude is a psychological process that cannot be directly observed; it is manifested through behaviors and verbal expressions. Attitudes explain the consistency in an individual's behaviors, consciously or unconsciously directing them toward specific actions. Most attitudes are rooted in childhood and are formed through experiences, learning, and reinforcement, which means that people are not born with certain attitudes. Attitudes form throughout life in many ways such as observation, responsive conditioning, and cognitive learning, changing alongside a person's social experiences.<sup>11</sup> Attitude change occurs either by engaging in behavior contrary to the attitude or by using persuasive communication methods. Individuals change their attitude in the direction of removing inconsistencies between conflicting attitudes and behaviors. Demirtaş discussed Hovland et al's suggestion that

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individual attitudes could be changed through learning and emphasized that the message conveyed should be attention-grabbing, comprehensible, memorable, and acceptable.<sup>12</sup>

In this context, virtual reality simulator (VRS) technology was used to increase the attention-grabbing and understandability of the message. Virtual reality simulator technology has enabled nurses to effectively change their attitudes toward neonatal skin assessment by providing a tangible and interactive learning environment. The use of this technological tool has improved the overall effectiveness of the training by increasing both better recall and acceptability of the messages delivered.<sup>10,12</sup> This study aimed to determine the effectiveness of VRS-based training in fostering positive attitudes toward neonatal skin assessment among NICU nurses. The study tested the following two hypotheses: (1) the VRS training has a positive impact on the attitude of nurses toward newborn skin assessment, and (2) there is a difference between pretraining and posttraining attitudes of nurses in assessing newborn skin.

## METHODS

This study was designed as a quasi-experimental research (pretest/posttest comparisons) to identify the attitudes of NICU nurses toward newborn skin assessment before and after VRS training. The study population consisted of a convenience sample. Participants were selected among ICU nurses working in private and public hospitals to participate in the study on a voluntary basis. Nurses were contacted through their affiliated hospital administrations and directors of nursing. While selecting the participants, the major criteria were that nurses had to have prior knowledge about the training and be highly motivated to receive VRS training. Before participating in the study, all nurses were given detailed information about the scope and purpose of the research, the training process, and possible benefits.

The sample size was calculated by power analysis using G\*Power 3.1.9.7 (Heinrich Heine University). It was estimated that at least 56 nurses ( $n = 28$  per group) would be required to achieve 80% power when comparing two independent groups at a significance level of .05 and an effect size of .70. Considering potential dropouts, it was planned to include 40 nurses in each group. Nurses at all levels who were working in the NICUs of private or public hospitals and agreed to participate were included in the study.

### Data collection tools

The Sociodemographic and Occupational Data Form and the NSAAS were used as data collection tools.

### Sociodemographic and Occupational Data Form

This form comprised 26 questions related to the nurses' sociodemographic and occupational characteristics.

### Neonatal Skin Assessment Attitude Scale

The NSAAS, developed by Coşkun and Çiğdem (2022), is a 5-point Likert-type scale and consists of a total of 35 items categorized under three subdimensions: awareness (items 1 to 19), practice (items 20 to 29), and avoidance (items 30 to 35). There are 6 negative items that are reverse scored. The overall score is obtained by summing the scores of 35 items, and possible total scores range from 35 to 175 points. Higher scores indicate greater positive attitude of nurses toward newborn skin assessment. The overall reliability coefficient of the NSAAS was  $\alpha = .978$ .<sup>1</sup>

### Data analysis

Because the conditions for using the central limit theorem were met, parametric tests were used to analyze the study data without conducting a normality test. However, because the skin assessment

competency score, one of the parameters included in the sociodemographic and occupational characteristics, is an ordinal data, nonparametric tests were used. Continuous data were summarized as mean, SD, and range, and categorical variables were reported as number and percentage. All statistical analyses were performed using SPSS version 21 (IBM Corp) and MedCalc (MedCalc Software Ltd.) at a 95% CI and a significance level of .05.

## Ethics

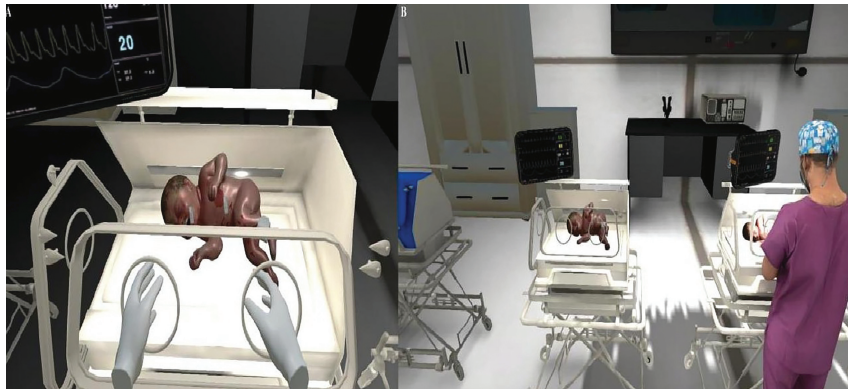
Ethical approval was obtained from the institutional review board of Hasan Kalyoncu University (2021/031; March 18, 2021), and written permissions were obtained from the hospitals where the study nurses worked. The study was funded by the Scientific Research Projects Coordination Unit of Hasan Kalyoncu University (project ID: BAP.LTP.002). All study nurses signed informed consent before participating in the study. The informed consent form was discussed with the nurses individually by the researcher and signed by the nurses after all their questions were answered. In this form, it is clearly stated that nurses can leave the study at any time and that the confidentiality of their data will be protected. Informed consent of the participants was obtained in full compliance with ethical rules, and this process increased the transparency and reliability of the current study.

## Study procedures

The entire training program (both theoretical and practical) was provided by a single pediatric nurse (author) who is also trained in education technologies.

The training program tested in this study aimed to enhance and/or reinforce positive attitudes toward newborn skin assessment among NICU nurses. In the literature, Hovland's Message-Learning Approach (also known as the Yale approach) is described as a theory based on the idea that attitudes are learned and can therefore be modified through a learning process.<sup>10,12,13</sup> The training program consisted of both theoretical learning and practice and lasted for a total of 4 weeks, including 3 weeks of theoretical training and 1 week of practice. Theoretical training was provided 1 hour/day per week for the first 3 weeks. In the final week, practical training was carried out with each nurse, involving one-on-one sessions at a patient's bedside for 1.5 hours/day for 7 days/week. The training program used a VRS as well as PowerPoint (Microsoft Corp) presentations to make the message more attention-grabbing and comprehensible, and the online Quizizz (Quizizz Inc.) learning platform was used to ensure memorability. To enhance acceptability, participants were rewarded with a certificate of participation. The Scrum methodology, an agile framework used in software development to enhance adaptability and efficiency, was used as the basis for software development for creating VRS. This approach enabled iterative progress, regular feedback loops, and improved collaboration among developers to refine the virtual simulation system. The Blender software (Blender Foundation) was used to create a realistic 3D model of the NICU. Subsequently, Unity Engine (Unity Technologies), a Game Development Engine, along with Microsoft's C# programming language, was used in the coding phase to create a simulation scenario for active use.

During the first week of the training, nurses were encouraged to reflect on their attitudes and behaviors in relation to newborn skin and to develop a strong positive attitude toward newborn skin assessment. Following theoretical training, nurses actively engaged in various tasks involving neonatal skin using VRS (Figure 1). The VRS training provided during this week aimed to strengthen positive attitude-behavior by improving awareness of newborn skin assessment. During the second week, basic skin care practices and common mistakes were discussed, and nurses were trained to



**FIGURE 1.** NEWBORN SKIN ASSESSMENT TRAINING USING VIRTUAL REALITY SIMULATION  
 A, The newborn figure shown to the nurses. B, The task of checking newborn skin after adhesive placement.

perform proper skin care and objective skin assessments using standardized scales. In the third week, the targeted positive attitude was emphasized by explaining potential undesired outcomes resulting from negative attitudes and behaviors. Over these 2 weeks, following theoretical training, nurses were presented with three different newborns with distinct skin characteristics to perform Neonatal Skin Condition Score scoring via the VRS (Figure 2). In the fourth week, nurses performed subjective and objective skin assessments using the Neonatal Skin Condition Score and Neonatal Skin Risk Assessment Scale. The differences between the two assessment methods were discussed. Also, the pathways necessary for attitude change regarding skin assessment were reiterated to reinforce the learning process.

The training was implemented in two identical programs, taking into account the nurses' shifts and to make the training more effective. The nurses were not assigned to fixed groups but were allowed to participate in any training session during the designated week depending on their work schedules. This flexibility in scheduling ensured that nurses were not assigned to fixed groups but rather had the opportunity to attend any of the training sessions within the given week, resulting in variable training groups and minimizing potential differences between the two groups. Additionally, the nurses who participated in the training program were employed in different NICUs than those in the control group. This separation

of work environments prevented any direct interaction between trained nurses and those in the control group, thereby eliminating potential cross-group influence.

### Pretest/posttest comparisons

Assessments, including both pretest and posttest evaluations, were conducted before and after training in both groups. At baseline, the NSAAS was administered to both groups simultaneously. The posttest assessments were carried out 2 weeks after the end of the 4-week training period (6 weeks after the baseline) for the training group and 4 weeks after the baseline for the control nurses. The study flow diagram (Figure 3) illustrates the pretest and posttest process, ensuring clarity in the timing of the assessments.

## RESULTS

### Participant characteristics

Among the NICU nurses (n = 73), 58.4% (n = 40) were allocated in the control group and 45.2% (n = 33) in the training group. Seven nurses were excluded due to incomplete data during the study period, and ultimately, the study was completed with a total of 73 nurses (n = 40 training group, n = 33 control group). Nearly half of the nurses (47.9%, n = 37) were in the 26- to 35-year age group, 63% (n = 46) were single, and the majority (71.2%, n = 52) did not



**FIGURE 2.** THREE DIFFERENT NEWBORNS WITH DISTINCT SKIN CHARACTERISTICS FOR NEONATAL SKIN ASSESSMENT TRAINING

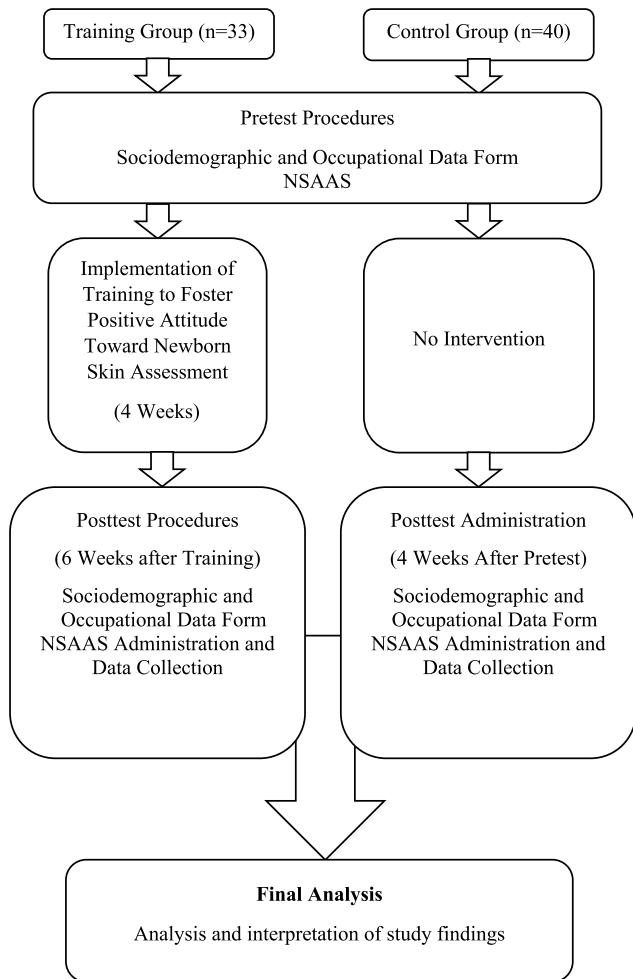


FIGURE 3. STUDY FLOW DIAGRAM

have children. Further, 86.3% (n = 63) of the nurses had a nuclear family, and 54.8% (n = 40) were RNs. Most nurses (72.6%, n = 53) were satisfied with their job. The majority (91.8%, n = 67) worked day and night shifts, and 79.5% (n = 58) worked 41 to 56 hours per week. Further, most nurses (80.8%, n = 59) worked at all levels in the NICU, 82.20% (n = 60) cared for 4 to 6 infants per day, and 56.20% (n = 41) performed skin assessments through observation. When the nurses were asked to assess their own level of competency in newborn skin assessment on a scale of 1 to 10, the mean score was 6.45 ± 1.76 (range, 2-10).

Significant differences were found between the training and control groups in terms of age, marital status, education level, having children, job satisfaction, weekly working hours, NICU level of care, number of infants cared for per day, participation in NICU nursing certification program, presence of formal training on newborn skin assessment, use of written protocols for skin care in the NICU, skin assessment method, and NICU work experience (P < .05; Table 1).

A comparison of NSAAS subdimension and total pretest/posttest scores for the training and control groups is presented in Table 2. It was observed that there was no statistically significant difference between the training and control groups in terms of NSAAS subdimension and total pretest scores (P > .05). However, comparing the posttest scores of the two groups, a significant difference was found between the training and control groups with respect to NSAAS subdimension and total posttest scores (P < .05).

TABLE 1. COMPARISON OF SOCIODEMOGRAPHIC CHARACTERISTICS BETWEEN TRAINING AND CONTROL GROUPS (N = 73)

Characteristics	Training Group, n (%) or Mean ± SD	Control Group, n (%) or Mean ± SD	P <sup>a</sup>
<b>Age group, y</b>			<.001
18-25	24 (72.7)	7 (17.5)	
26-35	9 (27.3)	26 (65.0)	
36-45	0 (0.00)	6 (15.0)	
>45	0 (0.00)	1 (2.50)	
<b>Marital status</b>			<.001
Married	5 (15.2)	22 (55.0)	
Single	28 (84.8)	18 (45.0)	
<b>Having children</b>			<.001
Yes	3 (9.10)	18 (45.0)	
No	30 (90.9)	22 (55.0)	
<b>Education level</b>			.003
High school	13 (39.4)	11 (27.5)	
Associate's degree in nursing	8 (24.0)	1 (2.50)	
RN	12 (36.4)	28 (70.0)	
<b>Job satisfaction</b>			.030
Yes	26 (78.8)	27 (67.5)	
No	7 (21.3)	13 (32.5)	
<b>Weekly working hours</b>			.024
0-40	1 (3.00)	8 (20.0)	
41-56	27 (81.8)	31 (77.5)	
57-72	5 (15.2)	1 (2.50)	
<b>NICU level of care</b>			.012
Level I	1 (3.00)	0 (0.00)	
Level II	1 (3.00)	0 (0.00)	
Level III	9 (27.3)	3 (7.5)	
All levels	22 (66.7)	37 (92.5)	
<b>No. newborns cared for per day</b>			<.001
1-3	0 (0.00)	13 (32.5)	
4-6	31 (93.9)	27 (67.5)	
≥7	2 (6.10)	0 (0.00)	
<b>Participation in NICU nursing certificate program</b>			.033
Yes	7 (21.2)	18 (45.0)	
No	26 (78.8)	22 (55.0z)	
<b>Formal training on newborn skin assessment</b>			.005
Yes	3 (9.10)	15 (37.5)	
No	30 (90.9)	25 (62.5)	
<b>Presence of written guidelines for newborn skin assessment in NICU</b>			<.001
Yes	24 (72.7)	0 (0.00)	
No	9 (27.3)	40 (100.0)	
<b>Method of skin assessment</b>			<.001
Observation	7 (21.2)	34 (85.0)	
Using scales	26 (78.8)	6 (15.0)	
<b>NICU work experience (mo)</b>	77.7 ± 44.7	45.8 ± 37.6	.006 <sup>b</sup>
<b>Newborn Skin Assessment Attitude Scale</b>	6.6 ± 1.8	6.3 ± 1.6	.52 <sup>b</sup>

Abbreviation: NICU, neonatal ICU.

<sup>a</sup>χ<sup>2</sup> test.

<sup>b</sup>Mann-Whitney U test.

**TABLE 2. BETWEEN-GROUP COMPARISON OF PRETEST/POSTTEST MEAN TOTAL NSAAS AND SUBDIMENSION SCORES (N = 73)**

NSAAS Scores	Control Group, Mean ± SD	Training Group, Mean ± SD	<i>P</i> <sup>a</sup>
<b>Pretest</b>			
Awareness subdimension	78.9 ± 14.05	80.91 ± 7.99	.47
Practice subdimension	40.95 ± 7.94	42.76 ± 4.17	.22
Avoidance subdimension	20.95 ± 5.37	22.57 ± 4.53	.17
Total	140.8 ± 23.25	146.24 ± 14.81	.25
<b>Posttest</b>			
Awareness subdimension	81.75 ± 9.18	87.27 ± 6.65	.005
Practice subdimension	42 ± 5.24	44.79 ± 4.14	.02
Avoidance subdimension	19.65 ± 6.25	26.15 ± 3.68	<.001
Total	143.4 ± 17.18	158.21 ± 12.26	<.001

Abbreviation: NSAAS, Neonatal Skin Assessment Attitude Scale.

<sup>a</sup>Student *t* test.

The intragroup comparison of NSAAS subdimension and total pretest/posttest scores for the training and control groups is shown in Table 3. There was no significant difference between the NSAAS total and subdimension pretest and posttest scores among the control nurses (*P* > .05). However, the NSAAS subdimension and total posttest scores of the nurses in the training group were significantly higher compared with their pretest scores (*P* < .05).

## DISCUSSION

This study showed that, when combined with theoretical training on attitude change, the VRS training was effective in enhancing or reinforcing positive attitudes toward newborn skin assessment among the NICU nurses. Therefore, both hypotheses of the study were accepted.

The daily treatments conducted in the NICU may predispose newborn skin to injury, whereas failure to perform regular skin monitoring and assessment may result in an increase in morbidity. In a study by Altıntaş<sup>14</sup> investigating skin problems in infants admitted to the NICU, it was reported that 84% of newborns experienced skin injury. The aforementioned report suggested that skin injuries persist widely among newborns admitted to the NICU. Routine skin assessment facilitates identification of newborns at risk of compromised skin integrity, which can contribute to a reduction in the incidence of skin injuries. In light of this information, enhancing positive attitudes and/or reinforcing existing positive attitudes among NICU nurses toward skin assessment seems crucial for prompt diagnosis and treatment of potential skin damage in newborns.

The study sample comprised NICU nurses (n = 73) who were divided into two groups: the training group (n = 33) and the control group (n = 40). Statistically significant differences were found between the two groups in terms of age, marital status, having children, education level, job satisfaction, work experience, NICU level of care, number of infants cared for per day, being a certified NICU nurse, receiving formal training on newborn skin assessment, presence of written skin care guidelines in the NICU, method of skin assessment, and weekly working hours. Although there were significant differences between the training and control groups in this study, the pretest total NSAAS and subdimension scores were comparable. This discrepancy may be attributed to the fact that the majority of nurses in the training group were working in a private hospital, whereas most of the control

nurses were employed in a public hospital; individual characteristics of the nurses may have also played a role.

Various training strategies, including simulation experience, are used to ensure the quality of attitude training provided to the nurses.<sup>15</sup> In line with this information, theoretical knowledge and the VRS training technique were used in attitude training provided to the NICU nurses included in this study. Recent studies have shown that training utilizing simulation technology such as VRS has been highly effective.<sup>16</sup> A study by Yilmazer et al<sup>17</sup> exploring the impact of in situ simulation training on preventing PIs among nurses found that after receiving simulation training, nurses' knowledge, performance, and care practices improved considerably. In a study by Lee<sup>18</sup> examining the implementation and evaluation of VRS as an IV injection training system, VRS was found to be more effective in IV injection training compared with conventional training methods.

Comparing the pretest/posttest total NSAAS and subdimension scores of the control group versus training group (Table 2), no significant difference was observed in the pretest scores between the two groups in any of the NSAAS subdimensions or the total score. However, when comparing the posttest scores between the control and training groups, a significant difference was found in all posttest subdimension and total NSAAS scores. Nurses in the training group showed significantly higher scores in all three subdimensions, and the total NSAAS score compared with those in the control group. On the intragroup comparison of pretest and posttest scores of the NSAAS total and subdimensions (Table 3), no significant pretest/posttest difference was observed in any of the NSAAS subdimension scores or the total score in the control group. However, in the training group, the posttest scores in all NSAAS subdimensions and the total score were significantly higher compared with the pretest scores. Therefore, it was concluded that nurses in the training group exhibited a significant increase in awareness, practice, and avoidance subdimensions and the overall NSAAS score in their posttest scores compared with their pretest scores.

Regarding the literature on VRS training, Liu et al<sup>19</sup> examined the impact of VRS-based cardiopulmonary resuscitation training provided to kindergarten teachers on their attitudes and self-efficacy. They reported a significant improvement in the self-efficacy of teachers in performing cardiopulmonary resuscitation and their attitudes after training compared with pretraining. Zhang et al<sup>20</sup> investigated the effect of VRS-based training on the response capability of

**TABLE 3. INTRAGROUP COMPARISON OF NSAAS SUBDIMENSION AND TOTAL MEAN PRETEST/POSTTEST SCORES FOR THE TRAINING AND CONTROL GROUPS (N = 73)**

NSAAS	Pretest	Posttest	<i>P</i> <sup>a</sup>
<b>Control group</b>			
Awareness subdimension score	78.9 ± 14.05	81.75 ± 9.18	.21
Practice subdimension score	40.95 ± 7.94	42 ± 5.24	.44
Avoidance subdimension score	20.95 ± 5.37	19.65 ± 6.25	.25
Total score	140.8 ± 23.25	143.4 ± 17.18	.41
<b>Training group</b>			
Awareness subdimension score	80.91 ± 7.99	87.27 ± 6.65	<.001
Practice subdimension score	42.76 ± 4.17	44.79 ± 4.14	.01
Avoidance subdimension score	22.57 ± 4.53	26.15 ± 3.68	<.001
Total score	146.24 ± 14.81	158.21 ± 12.26	<.001

Abbreviation: NSAAS, Neonatal Skin Assessment Attitude Scale.

<sup>a</sup>Paired *t* test.

public health emergency reserve nurses in China. In that study, nurses in the training group showed significant improvements in knowledge, emergency care competency, and disaster preparedness scores compared with control nurses. Revello and Fields<sup>21</sup> conducted a study aiming to enhance nurses' skin assessment compliance in a rehabilitation unit. Following training on hospital-acquired PI, a significant increase in skin assessment frequency was observed in the training group, along with a decrease in the incidence of PI. Armour-Burton et al<sup>22</sup> implemented the Healthy Skin Project, providing education to nurses between 2003 and 2011 using self-learning modules, case presentations, and one-on-one training. Additionally, a PI algorithm tool was developed to demonstrate step-by-step wound management and documentation. The mean incidence of PI decreased from 4.4% in 2003 to 0.0% in 2011 after completion of the project.<sup>22</sup> These studies exemplify the use of VRS training among nurses and corroborate the effectiveness of VRS training observed in the current study.

### Study limitations

First, the study focused specifically on NICU nurses and was conducted on a specialized population, which limit extrapolation of the results to all types of healthcare professionals and the general population. In addition, the evaluation was based solely on a specific VRS-based training developed by the study investigators. Therefore, the effectiveness of this training compared with other training methods should be assessed in further studies.

### CONCLUSIONS

This study examined the effect of VRS-based training on nurses working in the NICU. Although the findings of the study support the integration of VRS into care and evaluation in nursing practice, the authors believe that VRS-based training can contribute to the prevention of skin injuries by increasing the competency of nurses in newborn skin assessment. One of the implications for research is to replicate the study by randomizing the nurses to prevent potential selection bias. Virtual reality simulator-based training provides a significant improvement in NICU nurses' attitudes toward newborn skin assessment, indicating that VRS is an effective training tool that can be used to help reinforce positive attitudes of NICU nurses in neonatal skin care and assessment.

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