Effectiveness of Video-assisted Teaching Program on Insulin Therapy among Nursing Students

Manandhar S,[1] Shrestha S,[1,2] Shrestha B,[1] Pun KD[1]

[1]Nursing and Midwifery Program,

[2]Department of Public Health,

Kathmandu University School of Medical Sciences,

Dhulikhel Hospital, Kathmandu University Hospital,

Dhulikhel, Kavre, Nepal.

Corresponding Author

Subina Manandhar,

Nursing and Midwifery Program,

Kathmandu University School of Medical Sciences,

Dhulikhel Hospital, Kathmandu University Hospital,

Dhulikhel, Kavre, Nepal.

E-mail: subina.manandhar@kusms.edu.np

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ABSTRACT

Background

Video-assisted teaching in the nursing field serves as a valuable and innovative tool to enhance the learning experience for students. When there is a demonstration technique available, video-based education can be a good replacement. As future nurses, nursing students need a comprehensive understanding of insulin therapy to effectively educate and empower patients in managing their condition.

Objective

To assess the effectiveness of a video-assisted teaching program in improving nursing students' knowledge and skills in insulin therapy.

Method

A quasi-experimental study was conducted among B.Sc. Nursing students from two Kathmandu University-affiliated colleges from 22nd March to 25th May 2024. Eligible students were allocated into the intervention group (n1=62) received both traditional demonstration and 10-minute video instruction, while the control group (n2=55) received only traditional demonstration. Baseline demographic data, knowledge, and skills were collected using self-administered questionnaires and a checklist. After four weeks, post-intervention assessments were conducted. Ethical approval and written informed consent was obtained. Data were analyzed using SPSS version 20 with descriptive statistics and inferential tests including t-test, Mann-Whitney U-test and Wilcoxon signed-rank test.

Result

Knowledge and skill scores significantly increased in both groups (p value <0.001). However, the intervention group demonstrated a significantly higher increase in knowledge and skill scores compared to the control group, with p-values of 0.026 and <0.001, respectively.

Conclusion

The study indicates that video-assisted teaching effectively enhances nursing students' knowledge and skills in insulin administration. Nursing education programs in Nepal can integrate such tools to produce more competent and confident nurses.

KEY WORDS

Demonstration, Insulin, Knowledge, Nursing education, Video

INTRODUCTION

Video-assisted teaching in the nursing field has gained prominence as an innovative and effective tool to enhance student learning. It enables learners to proceed at their own pace, revisit complex topics, and observe clinical procedures multiple times. This repeated exposure helps bridge the gap between theoretical understanding and clinical application. In particular, video demonstrations can serve as suitable alternatives when live instruction is not feasible.[1]

Extensive studies have shown that video-based teaching supports knowledge retention and skill development among nursing students.[1] Despite this, traditional teaching methods such as lectures, laboratory demonstrations, and supervised clinical practice continue to dominate, especially in developing regions.[2-4] However, these methods face several limitations. In the context of diabetes mellitus, a chronic condition with rising prevalence in countries like China, India, Brazil, and Nepal, proper insulin administration is critical to patient safety and effective disease management.[2-4] Errors in insulin delivery can result in serious consequences such as hypoglycemia or hyperglycemia.[4,5] Ensuring that nursing students gain accurate knowledge and confidence in administering insulin is essential.[5,6] Unfortunately, the scarcity of context-specific educational videos and limited access to audiovisual tools in Nepal hamper the effectiveness of modern teaching strategies.[7-10]

Given these challenges, this study aimed to assess the effectiveness of a video-assisted teaching program in improving the knowledge and practical skills of nursing students in insulin therapy. By incorporating technology-enhanced learning, we sought to provide a sustainable, reproducible, and contextually relevant approach to strengthen nursing education and ultimately improve patient care outcomes.

METHODS

A quasi-experimental study design was employed to assess the effectiveness of a video-assisted teaching program on insulin therapy knowledge and the skill of insulin administration among nursing students.

The study was conducted in two nursing colleges affiliated with Kathmandu University. Data collection began on March 22nd to 25th May 2024, with follow-up occurring four weeks after the intervention.

A total of 117 nursing students enrolled in the first, second, and third years of the Bachelor of Science in nursing program were recruited using a non-probability purposive sampling method, based on predefined inclusion and exclusion criteria. Among them, 62 participants were assigned to the intervention group, which received both video-assisted teaching and traditional demonstration. The remaining 55 participants formed the control group and received only the traditional demonstration, as illustrated in figure 1.

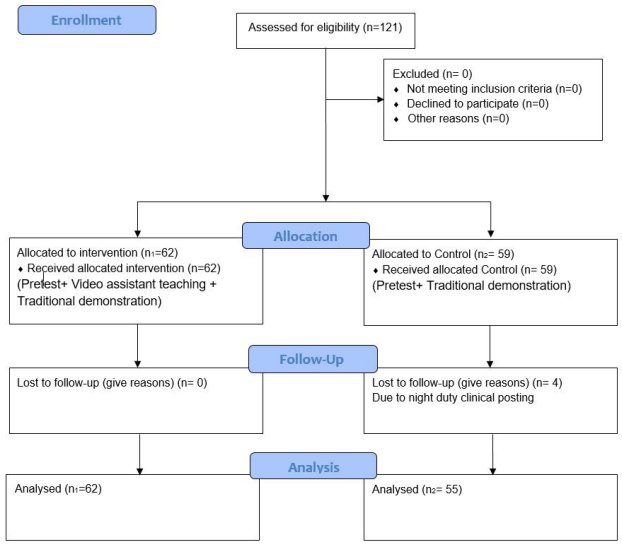

Figure 1. Participant Recruitment Process

After obtaining ethical approval from the Nepal Health Research Council (NHRC) with registration number 746-2023, and written informed consent from each participant, baseline data were collected. This included demographic information and prior knowledge related to insulin therapy using a self-administered questionnaire. The skill level in insulin administration was assessed at baseline using a 21-step checklist, where each correctly performed step was scored as "1" and an incorrect or incomplete step was scored as "0." This checklist was adapted from existing guidelines[11] and piloted on 10 nursing students at Dhulikhel Hospital to test its reliability. The Cronbach's alpha for the tool was found to be 0.8, indicating good internal consistency.

Participants' skills were assessed through direct observation of insulin administration on a sandbag model, which was used in place of a mannequin due to resource limitations. Both the intervention and control groups initially received a traditional demonstration on insulin administration. The session included essential components such as insulin types, timing, storage, and key considerations during administration.

The intervention group additionally received a 10-minute video-assisted teaching session, which was designed by the principal investigator. The video delivered structured content on insulin therapy in diabetes mellitus, including types of insulin, injection techniques, storage, and safe handling practices. The post-test assessment of knowledge and skill was conducted four weeks after the initial intervention to evaluate the program's effectiveness. The control group also received the video-assisted teaching after the post-test to ensure ethical parity.

Data analysis was performed using SPSS Statistics version 20. Descriptive statistics, including frequencies and percentages, were used to summarize categorical variables, while means and standard deviations were applied to continuous variables. Inferential statistics, including appropriate tests of significance (paired and unpaired t-tests, Mann-Whitney U test, Wilcoxon signed-rank test), were used to compare pre- and post-test knowledge and skill scores between and within the two groups.

RESULTS

Study shows that the mean age of the nursing students in the study was 21.24 years, with a standard deviation of 0.910 in the experimental group, while it was 20.47 + 1.045 in the control group. In terms of educational level, more than half of the students were in their second year, over one-third were in their first year, and almost one-third were in their third year (Table 1).

Table 1. Baseline Information of Nursing Students (n=117)

Group	Experimental	Control
Age in years (Mean+ SD)	21.24 ± 0.910	20.47 ± 1.045
Educational Level:		
a. First year	-	31 (26.5)
b. Second year	35 (29.9)	24 (20.5)
c. Third year	27 (23.1)	-

The study reveals that a significantly higher proportion of students in the experimental group (85.5%) reported prior experience with insulin administration compared to the control (65.5%) ($p < 0.001$). Conversely, a larger percentage of students in the control group (34.6%) had no prior experience compared to the experimental group (14.5%). Regarding receipt of information on insulin therapy, a higher percentage of the students (88.7%) in the experimental group reported receiving information compared to the control group (69.1%). In contrast, more students in the control group (30.9%) indicated they had not received information compared to the experimental group (11.3%). Among students who received information, the primary sources included classroom/teacher/lecturer (35 responses) (Table 2).

While comparing the median knowledge scores before and after the intervention for both the experimental and control groups, the experimental group (n=62) had a pre-intervention median score of 10.0 (IQR=7) and a post-intervention score of 11.0 (IQR=4), with a significant improvement ($p < 0.001$). The control group (n=55) also improved from a median score of 6.0 (IQR=2) to 8.0 (IQR=3), with a significant change ($p < 0.001$). Both groups showed statistically significant increases in knowledge, as determined by the Wilcoxon signed-rank test (Table 3).

Table 2. Clinical related information of nursing Students (n=117)

Group		Experimental	Control	p-value
Previous Experience of Injecting Insulin	Yes f (%)	53 (85.5)	36 (65.5)	<0.001*
	No f (%)	9 (14.5)	19 (34.6)	
Received Information regarding Insulin Therapy	Yes f (%)	55 (88.7)	38 (69.1)	0.022*
	No f (%)	7 (11.3)	17 (30.9)	
Receiving Information regarding Insulin therapy (multiple response)				
Classroom/ teacher/lecturer			35	
Course Book/YouTube			15	
Seniors/Hospital Staffs			19	
Seniors/Hospital Staffs			33	

*t-test

Table 3. Knowledge Score in Experimental and Control Group (n=117)

Group	Pre-intervention knowledge Median score (IQR)	Post-intervention knowledge Median score (IQR)	p value
Experimental (n_1=62)	10.0 (7)	11.0 (4)	< 0.001
Control (n_2=55)	6.0 (2)	8.0 (3)	< 0.001

Wilcoxon signed-rank test

In comparison of the skill scores before and after intervention, skill scores of the experiment and control groups, the experimental group showed a significant increase in skill scores after the intervention (from a median of 6.0 to 15.0), with a p-value < 0.001, indicating a statistically significant improvement. The control group also showed a statistically significant change (p-value < 0.001), but the median score remained the same (7.0). The change in IQR (from 1 to 4) suggests some variability in scores, but no overall improvement (Table 4).

Table 4. Skill Score in Experimental Group and Control Group (n=117)

Group	Before intervention skill median score (IQR)	After intervention skill median score (IQR)	p value
Experimental (n_1=62)	6.0 (6)	15.0 (10)	< 0.001
Control (n_2=55)	7.0 (1)	7.0 (4)	< 0.001

Wilcoxon signed-rank test

The study presents the change in skill scores between an experimental group and a control group post intervention. The experimental group showed a significantly higher median change in skill score (10, IQR: 12–7) compared to the control group (4, IQR: 5–2) with a p-value < 0.001. This indicates that the intervention led to a greater improvement in skill scores in the experimental group compared to the control group (Table 5).

Table 5. Post-intervention change in skill score in experimental and control group (n=117)

Group	Change in skill score median	p value
Experimental	10 (12-7)	< 0.001
Control	4 (5-2)	

Mann-Whitney-U test

The study presents the post intervention change in knowledge score was assessed in both the experimental and controlled groups. The median change in knowledge score was 2 (IQR: 1-2) in the experimental group and 2 (IQR: 4-2) in the controlled group. The Mann- Whitney U test revealed a statistically significant difference between the two groups (p=0.026), indicating that the intervention had a significant impact on improving knowledge scores in the experimental group compared to the controlled group (Table 6).

Table 6. Post-intervention change in knowledge score in experimental and controlled group (n=117)

Group	Change in Knowledge Score Median (IQR)	p value
Experimental	2 (1-2)	0.026
Controlled	2 (4-2)	

Mann-Whitney-U test

DISCUSSIONS

The present study demonstrated a significant improvement in both knowledge and skill scores in the intervention and control groups, with the intervention group exhibiting a statistically greater increase. These findings suggest that while both traditional and blended teaching methods have positive effects, the integration of video-assisted learning can further enhance educational outcomes among students.

A notable finding was the significantly higher improvement in knowledge scores in the intervention group compared to the control group (p = 0.026). This supports existing literature, such as the Taiwanese study that reported superior outcomes in knowledge and competency scores when video-based instruction was utilized over traditional demonstration methods.[12,13] The enhanced results in the intervention group can be attributed to the flexible and self-paced nature of video learning, which allows learners to revisit the material at their convenience. This aligns with previous qualitative studies that emphasized the benefits of personalized pacing in promoting deeper understanding and long-term memory retention.[14-16]

The skill score improvement in the experimental group was also statistically significant (p < 0.001), consistent with findings from Shrestha et al., who reported a substantial improvement in post-test scores following a video teaching intervention.[17] However, Devi et al. found contrasting results, where traditional demonstration yielded higher post-test skill scores compared to video-assisted instruction.[18] This disparity might be due to differences in the intervention design; Devi's study relied solely on video-assisted teaching, whereas the present study used a blended model combining traditional demonstration with video learning. This supports the argument that a hybrid teaching approach can be more effective in developing practical competencies, particularly in clinical education.

Furthermore, while both groups showed a median knowledge score change of 2, the statistically significant difference between them (p = 0.026) reinforces findings from Doijad and Kamble, who observed similar knowledge gains in both methods but noted a preference among students for video demonstrations.[1] This preference may be linked to the multisensory experience videos provide, enhancing cognitive processing and memory retention.[19] This highlights a broader pedagogical implication: educators should consider learners' preferences and learning styles when designing curricula.

The significant post-intervention improvement in knowledge among the experimental group aligns with Ratri D's study, which emphasized the effectiveness of video-assisted teaching for knowledge acquisition.[3] Similarly, Shrestha et al. also noted marked improvements in post-test knowledge scores among students exposed to video-based content.[17] The use of simple, understandable language in these videos played a crucial role, as did the incorporation of native languages, which has been shown in multiple qualitative studies to enhance comprehension and cultural relevance in medical education.[20-22] These findings advocate for the localization and contextual adaptation of educational materials in health sciences education.

Despite these promising results, several limitations must be acknowledged. First, the study employed a quasi-experimental design without randomization, which could introduce selection bias and limit internal validity. Second, a sandbag was used instead of a mannequin for the demonstration and return demonstration of the insulin injection technique. While sandbags provided a cost-effective alternative, they lack anatomical realism, potentially affecting the skill acquisition and transferability of training to real clinical scenarios. This limitation may have influenced students' ability to practice proper anatomical positioning and injection technique, which is a critical component of procedural competency.[23,24]

In terms of confounding factors, students who were more comfortable with digital tools might have gained more from video-based learning.[25] Also, the teacher's enthusiasm and skill during traditional demonstrations could have influenced how well students in the control group performed.[26]

Despite these limitations, the implications of this study are significant. The findings reinforce a growing body of literature advocating for the integration of digital media, particularly video-assisted learning, in health

professional education. Video-based instruction not only enhances knowledge and skill acquisition but also offers flexibility, learner autonomy, and the ability to revisit complex concepts as needed.[27,28] These attributes make it especially effective in diverse educational settings where resources may be constrained. In conclusion, while both experimental and control groups benefited from their respective instructional methods, the superior outcomes in the intervention group highlight the potential of integrating multimedia tools into nursing education.

For demonstration and return demonstration to assess the skill of insulin injection technique, we used a sandbag instead of a mannequin. Although all the participants were from bachelor's level, they were not homogeneous in terms of clinical information, which might have influenced the result in a certain way.

CONCLUSION

This study implies that the video intervention was effective in increasing the knowledge and skills in insulin administration among nursing students. Hence, nursing education programs in Nepal can prioritize comprehensive insulin therapy training using our educational video to cultivate competent and confident nurses. Additionally, the control group, which utilized the traditional demonstration method, also showed improvement in their scores, indicating its continued value. In resource-limited settings where technology access may be constrained, traditional demonstrations remain a viable and effective teaching approach for nursing skills development.

Based on the findings, nursing education programs can include video-based learning tools for essential skills like insulin administration to enhance student learning and better prepare nurses to administer insulin confidently. Traditional demonstration methods remain effective in improving student skills. Therefore, nursing schools in resource-limited settings should continue using hands-on demonstrations to provide quality training in essential nursing skills.

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