



The Effect of 3D Animated Video Education on Knowledge of Postoperative Pain Management Among Anesthesiology Nursing Students at Universitas 'Aisyiyah Yogyakarta

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ABSTRACT

Postoperative pain is a common problem experienced by surgical patients and requires appropriate management to improve recovery and patient comfort. Therefore, anesthesiology nursing students need adequate knowledge regarding postoperative pain management before entering clinical practice. The use of innovative educational media, such as 3D animated videos, is expected to improve students' understanding more effectively than conventional learning methods. This study aimed to determine the effect of 3D animated video education on the knowledge level of anesthesiology nursing students regarding postoperative pain management. This study employed a quantitative approach with a quasi-experimental pretest-posttest control group design. A total of 60 anesthesiology nursing students at Universitas Aisyiyah Yogyakarta participated in this study and were divided into an intervention group and a control group, with 30 respondents in each. Data were collected using a knowledge questionnaire and analyzed using the Wilcoxon Signed-Rank Test and the Mann-Whitney U Test. The results showed a significant increase in knowledge scores before and after the intervention in both groups ($p = 0.000$). Furthermore, the intervention group demonstrated significantly greater knowledge improvement than the control group ($p = 0.000$). It can be concluded that 3D animated video education is effective in improving students' knowledge of postoperative pain management.

Keywords: 3D animated video, education, knowledge, postoperative pain management, anesthesiology nursing students

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1. INTRODUCTION

Anesthesiology nursing students are prospective healthcare professionals who play an important role in anesthesia and perioperative services. One essential competency to master is postoperative

pain management, as effective pain control is integral to patient safety and healthcare quality. Adequate knowledge regarding postoperative pain management is necessary to prepare students for clinical practice and enable them to provide

evidence-based nursing care (Fatonah et al., 2023). Knowledge of postoperative pain management is also essential, as pain assessment and management are key competencies in perioperative nursing care that directly influence patient outcomes (Handayani et al., 2025). Postoperative pain is a physiological response to surgical trauma that may affect the nervous, endocrine, and cardiovascular systems. If not managed appropriately, postoperative pain can lead to complications such as increased blood pressure, respiratory disorders, delayed wound healing, anxiety, stress, sleep disturbances, and reduced patient satisfaction with healthcare services (Rachmadina et al., 2025). Effective pain management requires adequate understanding of pain assessment, pharmacological interventions, and nonpharmacological approaches (Jamal & Fachrul, 2022). Accurate pain assessment is particularly important because it underpins the selection of appropriate pain management strategies (Andreyani & Bhakti, 2023).

Furthermore, postoperative pain remains a significant healthcare problem, with approximately 80% of patients experiencing pain after surgery despite receiving analgesic therapy (Park et al., 2023). Knowledge of postoperative pain management includes understanding pain

physiology, pain assessment, and pharmacological and nonpharmacological interventions. Students with higher levels of knowledge are better able to apply appropriate pain management techniques in clinical practice (Fatonah et al., 2023). Educational interventions regarding pharmacological and nonpharmacological pain management have been reported to improve students' understanding and ability to manage pain effectively (Handayani et al., 2023). However, learning processes in many educational institutions still rely heavily on lectures and PowerPoint presentations, which may be less attractive and less effective for digital-generation students (Efkelin et al., 2023). Therefore, innovative learning approaches are required to improve students' engagement and learning outcomes. Advances in educational technology have encouraged the use of innovative learning media, including animated videos. Educational media play an important role in improving students' understanding and learning outcomes by facilitating the delivery of information in more engaging and interactive ways (Putra & Salsabila, 2021). Animated video combines visual, audio, and narrative elements, allowing information to be delivered more engagingly and memorably. Previous studies have demonstrated that

animation-based learning media can increase students' interest in learning, long-term retention, and critical thinking skills (Murtiningsih & Hanif, 2021).

Furthermore, video-based learning has been shown to improve knowledge acquisition and learning effectiveness among healthcare students (Sari & Sundari, 2021). Educational videos can also enhance students' confidence and self-efficacy during the learning process (Fauzi & Purnamasari, 2024). Similar findings were reported by Halmuniati et al. (2022), who found that video animation significantly improved learning outcomes, and by Rahmawati et al. (2022), who demonstrated that audiovisual media effectively increased learning achievement among health students. The implementation of digital learning has expanded significantly in health education, particularly following technological advancements and changes in educational practices. Almarzooq et al. (2020) reported that technology-based learning provides greater flexibility and enhances educational effectiveness among healthcare students. Likewise, Kindangen et al. (2022) found that audiovisual media increase student motivation and engagement during learning activities. Aji et al. (2025) also demonstrated that video-based education effectively improved

students' knowledge regarding healthcare-related topics, while Choeron and Metrikayanto (2025) reported that educational videos enhanced students' understanding of complex health concepts. Despite the growing use of educational videos in nursing education, studies specifically examining the effect of 3D animated video education on postoperative pain management knowledge among anesthesiology nursing students remain limited. Most previous studies focused on procedural training and general health education rather than postoperative pain management (Fatonah et al., 2023). This limitation represents a research gap and highlights the need for further investigation. The novelty of this study lies in the application of 3D animated video education as an innovative learning medium to improve knowledge of postoperative pain management among anesthesiology nursing students. At Universitas Aisyiyah Yogyakarta, anesthesiology nursing students begin learning the fundamental concepts of postoperative pain management as part of perioperative competencies. However, preliminary observations and interviews indicated that students' understanding of both theoretical concepts and clinical applications remained suboptimal. Therefore, it is necessary to evaluate the

effectiveness of 3D-animated video-based education in improving students' knowledge. This study aimed to determine the effect of 3D animated video education on the knowledge level of anesthesiology nursing students regarding postoperative pain management.

2. METHODS

This study used a quantitative research method with a quasi-experimental design and a pretest-posttest control group approach. The research was conducted at the Anesthesiology Nursing Study Program of Universitas Aisyiyah Yogyakarta. The subjects of this study were 60 anesthesiology nursing students who met the inclusion criteria. The respondents were divided into two groups, namely the intervention group (n = 30) and the control group (n = 30). The intervention group received education through a 3D-animated video on postoperative pain management,

while the control group received conventional learning media. The educational intervention was conducted according to the predetermined schedule. Knowledge levels regarding postoperative pain management were measured before the intervention (pretest) and after the intervention (posttest) using a validated questionnaire. Data collection was carried out through questionnaire administration and observation of respondents' participation during the educational process. The collected data were analyzed using the Statistical Package for Social Sciences (SPSS). The Wilcoxon Signed-Rank Test was used to assess differences in knowledge levels before and after the intervention within each group. In contrast, the Mann-Whitney U Test was used to compare knowledge improvement between the intervention and control groups. A p-value of less than 0.05 was considered statistically significant.

3. RESULTS

Table 1. Respondent Characteristics (n=30)

Respondent Characteristics	Intervention		Control	
	f	(%)	f	(%)
Gender				
Male	9	30	7	23.3
Female	21	70	23	76.7
Age				
19–20 years	22	73.3	26	86.7
21–22 years	8	26.7	4	13.3

Table 1 shows that the majority of respondents in both the intervention and control groups were female. Most respondents were aged 19–20 years. In the intervention group, female respondents accounted for 70.0%, while in the control group, they accounted for 76.7%.

Furthermore, respondents aged 19–20 years comprised 73.3% of the intervention group and 86.7% of the control group. These findings indicate that the respondents were predominantly female and within the late adolescent age category.

Table 2. Knowledge Level Before and After in the Intervention Group

Knowledge Level	Pre-intervention		Post-intervention	
	f	(%)	f	(%)
Poor	13	43.3	1	3.3
Moderate	14	46.7	4	13.3
Good	3	10.0	25	83.3

Table 2 shows that the knowledge level of respondents in the intervention group increased after receiving education through a 3D animated video. Before the intervention, most respondents were in the moderate knowledge category (46.7%) and poor knowledge category (43.3%). After the intervention, the majority of respondents were in the good knowledge

category, accounting for 25 respondents (83.3%). Meanwhile, the proportion of respondents with poor knowledge decreased from 43.3% to 3.3%. These findings indicate that education delivered via a 3D animated video improved respondents' knowledge of postoperative pain management.

Table 2. Knowledge Level Before and After in the Control Group

Knowledge Level	Pre-intervention		Post-intervention	
	f	(%)	f	(%)
Poor	12	40	4	13.3
Moderate	14	46.7	14	46.7
Good	4	13.3	12	40.0

Table 3 shows that the knowledge level of respondents in the control group increased after receiving conventional educational materials. Before the intervention, most respondents were in the moderate knowledge category (46.7%), followed by the poor knowledge category

(40.0%). After the intervention, the proportion of respondents with good knowledge increased from 13.3% to 40.0%, while the proportion of respondents with poor knowledge decreased from 40.0% to 13.3%. However, most respondents remained in the moderate knowledge

category (46.7%). These findings indicate that conventional educational materials improved respondents' knowledge regarding postoperative pain management

Table 4. Wilcoxon Signed Ranks test results

Group	Category	f	Z	p-value
Intervention Group	Post-test < Pre-test	2	-4.490	0.000
	Post-test > Pre-test	27		
	Post-test = Pre-test	1		
Control Group	Post-test < Pre-test	5	-3.710	0.000
	Post-test > Pre-test	25		
	Post-test = Pre-test	0		

Table 4 shows that most respondents in both groups experienced an increase in knowledge scores after the intervention. In the intervention group, 27 respondents had higher post-test scores than pre-test scores, while only 2 respondents showed a decrease, and 1 respondent showed no change. In the control group, 25 respondents experienced an increase in knowledge scores, whereas 5 respondents showed a decrease. The Wilcoxon Signed Rank Test revealed a significant difference between pre-test and post-test knowledge

levels in both the intervention group ($Z = -4.490$; $p = 0.000$) and the control group ($Z = -3.710$; $p = 0.000$). However, the intervention group demonstrated greater knowledge improvement, as indicated by the higher proportion of respondents with increased post-test scores compared to the control group. These findings suggest that education delivered via a 3D animated video was more effective at improving respondents' knowledge of postoperative pain management.

Table 5. Effect of 3D Animated Video Education Knowledge of Postoperative Pain Management on Both Groups (N=60)

	Group	N	Mean Rank	Sum of Ranks	Z	P-value
Post-Test Results	Intervention Group	30	39.52	11,885.50	-4.031	0.000
	Control Group	30	21.48	644.50		

Table 5 shows that the intervention group obtained a higher mean rank score (39.52) than the control group (21.48). Based on Table 5, the intervention group obtained a higher mean rank score (39.52) than the control group (21.48). The Mann-Whitney U Test revealed a significant difference in post-test knowledge scores

between the intervention and control groups ($Z = -4.031$; $p = 0.000$). These findings indicate that respondents who received education through a 3D-animated video achieved significantly higher knowledge scores than those who received conventional educational materials. Therefore, 3D animated video education

was more effective in improving knowledge regarding postoperative pain management among anesthesiology nursing students.

4. DISCUSSION

Effect of 3D Animated Video Education on Knowledge of Postoperative Pain Management

The results of this study showed that the knowledge level of respondents in the intervention group increased after receiving education using a 3D animated video. Based on Table 2, the proportion of respondents with good knowledge increased from 10.0% before the intervention to 83.3% after the intervention, while the proportion of respondents with poor knowledge decreased from 43.3% to 3.3%. Furthermore, the Wilcoxon Signed Rank Test revealed a significant difference between pre-test and post-test knowledge scores ($Z = -4.490$; $p = 0.000$), indicating that 3D animated video education effectively improved respondents' knowledge regarding postoperative pain management. The improvement in knowledge may be explained by the ability of 3D animated videos to present information through both visual and auditory channels simultaneously. This learning approach enables students to

understand complex concepts more easily and retain information for a longer period.

According to Mayer (2021), multimedia-based learning enhances understanding because learners process information through verbal and visual representations at the same time. Therefore, educational content delivered through animation becomes more attractive, interactive, and easier to comprehend than conventional learning materials. The findings of this study are consistent with previous studies that demonstrated the effectiveness of animation-based learning media in improving knowledge and learning outcomes. Halmuniati et al. (2022) reported that video animation significantly improved students' learning achievement, while Pratiwi et al. (2022) found that animated video media enhanced students' understanding during the learning process. Similarly, Sari and Sundari (2021) concluded that video-based learning strategies improved nursing students' knowledge and clinical skills. These findings suggest that 3D animated video education can be utilized as an innovative learning medium to improve knowledge regarding postoperative pain management among anesthesiology nursing students.

Effect of Conventional Educational Materials on Knowledge of Postoperative Pain Management

The results of this study showed an increase in knowledge among respondents in the control group after receiving conventional educational materials. Based on Table 3, the proportion of respondents with good knowledge increased from 13.3% before the intervention to 40.0% after the intervention, while respondents with poor knowledge decreased from 40.0% to 13.3%. In addition, the Wilcoxon Signed-Rank Test revealed a significant difference between pre-test and post-test knowledge scores ($Z = -3.710$; $p = 0.000$), indicating that conventional educational materials were effective in improving respondents' knowledge of postoperative pain management. The increase in knowledge suggests that educational exposure contributes to the learning process by providing new information and experiences. Through educational materials, respondents gained a better understanding of postoperative pain management. Subsequently, they improved their knowledge levels. This finding is consistent with Rahman (2023), who reported that health education significantly improves knowledge by enhancing individuals' understanding of health-related information. Kartini et al.

(2025) found that educational interventions effectively increased participants' knowledge after receiving structured health education. Although the control group experienced significant improvement, the magnitude of change was lower than that observed in the intervention group. Conventional educational methods tend to rely on passive learning and offer limited visualization, which may reduce students' ability to understand and retain complex information fully. Putra & Salsabila (2021) stated that interactive learning media provide more effective learning experiences than conventional methods, while Kindangen et al. (2022) reported that audiovisual media enhance learner motivation and engagement. Therefore, although conventional educational materials can improve knowledge, their effectiveness appears to be lower than that of 3D animated video education in facilitating learning and knowledge retention.

Comparison Between the Intervention and Control Groups

The comparison of post-test knowledge scores between the intervention and control groups demonstrated that education delivered via a 3D animated video was more effective

than conventional educational materials. Based on Table 5, the intervention group obtained a higher mean rank score (39.52) than the control group (21.48). Furthermore, the Mann–Whitney U Test revealed a significant difference between the two groups ($Z = -4.031$; $p = 0.000$). These findings indicate that respondents who received education via a 3D-animated video achieved significantly higher knowledge scores on postoperative pain management than those who received conventional educational materials. The greater improvement observed in the intervention group may be attributed to the ability of 3D animated videos to present information in a more engaging and interactive way. Through the combination of visual illustrations, animation, and narration, students can understand complex concepts more easily and retain information more effectively. According to Mayer (2021), multimedia learning enhances knowledge acquisition by integrating visual and verbal information simultaneously. This finding is supported by Halmuniati et al. (2022), who reported that animation-based learning media significantly improved learning outcomes, and by Pratiwi et al. (2022), who found that animated video media enhanced students' understanding during the learning process. The findings of this study

are also consistent with previous research demonstrating the effectiveness of video-based learning in health education. Almarzooq et al. (2020) reported that digital learning technologies improve educational outcomes among healthcare students. Similarly, Rahmawati et al. (2022) found that audiovisual media were more effective in improving learning outcomes than conventional methods. Aji et al. (2025) and Choeron and Metrikayanto (2025) also reported that educational videos significantly increased knowledge and understanding of health-related concepts. Therefore, 3D-animated video education can be considered an innovative and effective learning strategy to improve knowledge of postoperative pain management among anesthesiology nursing students.

5. CONCLUSION

Based on the results of this study, education using a 3D animated video effectively improved the knowledge of anesthesiology nursing students regarding postoperative pain management. Both the intervention and control groups experienced significant increases in knowledge scores after receiving educational interventions. However, the improvement in the intervention group was greater than that in the control group.

The results of the Wilcoxon Signed-Rank Test showed significant differences between pre-test and post-test knowledge scores in both groups. In contrast, the Mann-Whitney U Test showed a significant difference between the intervention and control groups. These findings indicate that 3D animated video education is more effective than conventional educational materials in improving knowledge regarding postoperative pain management. Therefore, 3D animated videos can be utilized as an innovative educational medium to support learning activities among anesthesiology nursing students.

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AUTHOR CONTRIBUTIONS

UU was responsible for developing the research idea, conducting the literature review, preparing the research proposal, collecting and analyzing data, interpreting the results, and writing the manuscript. IR supervised the research process, provided guidance in the development of the research methodology, assisted in data interpretation, and reviewed the manuscript throughout the study. NH

evaluating the research's scientific quality, reviewing the manuscript, and offering recommendations to improve the study's final version.

CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this study. The research was conducted independently without any commercial, financial, or personal relationships.

DATA AVAILABILITY STATEMENT

The data used and analyzed in this study are not publicly available in order to protect the privacy and confidentiality of the participants. However, the data may be obtained from the corresponding author upon reasonable request and with appropriate consideration of ethical requirements.

REFERENCES

Aji, A., Suprpto, P., Handayani, N., & Rosidah, I. (2025). Pengaruh video edukasi terhadap pengetahuan pencegahan infeksi nosokomial di rumah sakit pada mahasiswa. *Jurnal Ilmu Kesehatan*, 14(November), 136–141. <https://ojs.widyagamahusada.ac.id/index.php/JIK/article/view/423>

- Almarzooq, Z. I., Lopes, M., & Kochar, A. (2020). Virtual learning during the COVID-19 pandemic: A disruptive technology in graduate medical education. *Journal of the American College of Cardiology*, 75(20), 2635–2638. <https://doi.org/10.1016/j.jacc.2020.04.015>
- Andreyani, L., & Bhakti, W. K. (2023). Validitas skala ukur nyeri visual analog and numerik ranting scales (VANRS) terhadap penilaian nyeri. *Jambura Journal of Health Science and Research*, 5(2), 730–736. <https://doi.org/10.35971/jjhsr.v5i2.19140>
- Choeron, R., & Metrikayanto, W. D. (2025). Memahami konsep infark miokard akut melalui media video pembelajaran. *Jurnal Ilmiah Keperawatan (Scientific Journal of Nursing)*, 11(2), 171–176. <https://doi.org/10.33023/jikep.v11i2.2492>
- Efkelin, R., Ramba, H. La, Suarti, N. M., Martini, M., & Rahmaningsih, A. (2023). Efektivitas pembelajaran dengan metode e-learning pada mahasiswa keperawatan. *An-Najat*, 1(2), 200–208. <https://doi.org/10.59841/an-najat.v1i2.204>
- Fatonah, S., Rahma Bakri, S., Tanjungkarang, P., & Studi Sarjana Terapan Keperawatan. (2023). Hubungan tingkat pengetahuan dengan penerapan perawat tentang manajemen nyeri non farmakologi pada pasien post operasi. *Jurnal Ilmu Kesehatan Indonesia (JKSI)*, 1(1), 1–7.
- Fauzi, A. K. A., & Purnamasari, V. (2024). Pengaruh edukasi menggunakan video balut bidai terhadap efikasi diri mahasiswa keperawatan anestesiologi Universitas 'Aisyiyah Yogyakarta. *Jurnal Kolaborasi Kesehatan*, 1, 73–84. <https://jurnal.kolibi.org/index.php/husada/article/view/2028>
- Halmuniati, H., Riswandi, D., Zainuddin, Z., & Asmin, L. O. (2022). Efektivitas media pembelajaran berbasis video animasi terhadap hasil belajar fisika. *Jurnal IPA & Pembelajaran IPA*, 6(4), 332–340. <https://doi.org/10.21831/jipi.v6i4.579>
- Handayani, N., Purnamasari, V., Anestesi, P., & Android, B. S. (2023). Edukasi penatalaksanaan non farmakologi komplikasi pasca anestesi melalui buku saku berbasis Android. *Jurnal Kesehatan Kusuma Dewa*, 14(1), 82–

90. <https://www.jurnal.ukh.ac.id/index.php/JK/article/view/973>
- Handayani, S. L., Sulistyarningsih, D. R., Suyanto, S., & Melastuti, E. (2025). Faktor pemberian terapi non farmakologi oleh perawat kepada pasien dengan nyeri post operasi di rumah sakit: Studi literatur. *Jurnal Ners*, 9(3), 4042–4048. <https://doi.org/10.31004/jn.v9i3.44497>
- Jamal, & Fachrul. (2022). Tinjauan pustaka: Penilaian dan modalitas tatalaksana nyeri. *Jurnal Kedokteran Nanggroe Medika*, 5(3), 66–73. <https://doi.org/10.35324/jknamed.v5i3.211>
- Kartini, S., Bagenda, E. F., & Hartati, S. (2025). Pengaruh edukasi kesehatan terhadap pengetahuan ibu tentang pencegahan stunting pada balita. *Jurnal Ilmu Kedokteran dan Kesehatan Indonesia (JIKKI)*, 5(1), 300–313. <https://researchhub.id/index.php/jikki/article/view/7203>
- Kindangen, M., Tulung, J. M., Massang, B., et al. (2022). Media audio visual dalam pembelajaran pendidikan agama Kristen: Studi tentang motivasi belajar siswa di masa pandemi. *Educatio*, 8(1), 337–343. <https://doi.org/10.31949/educatio.v8i1.2050>
- Mayer, R. E. (2021). *Multimedia learning* (3rd ed.). Cambridge University Press. <https://doi.org/10.1017/9781316941355>
- Murtiningsih, & Hanif Abdul Latif. (2021). Sosiologi. *Jurnal Pendidikan dan Pembelajaran*, IX, 302–309.
- Park, R., Mohiuddin, M., Arellano, R., Pogatzki-Zahn, E., Klar, G., & Gilron, I. (2023). Prevalence of postoperative pain after hospital discharge: Systematic review and meta-analysis. *British Journal of Anaesthesia*. <https://doi.org/10.1016/j.bja.2023.04.026>
- Putra, A. D., & Salsabila, H. (2021). Pengaruh media interaktif dalam perkembangan kegiatan pembelajaran pada instansi pendidikan. *Inovasi Kurikulum*, 18(2). <https://ejournal.upi.edu/index.php/JIK/article/view/36282>
- Rahman, Z. (2023). Pengaruh edukasi kesehatan terhadap self care pasien diabetes melitus tipe 2. *Jurnal Ilmiah Keperawatan*, 9(3), 577–581. <https://doi.org/10.33023/jikep.v9i5.1620>
- Rahmawati, D., Sari, N., & Kurniawan, A. (2022). Efektivitas media audiovisual terhadap peningkatan hasil belajar mahasiswa kesehatan. *Jurnal*

Pendidikan Kesehatan Indonesia,
10(1), 45–52.

Rachmadina, T., Muladi, A., Sarjana, P.,
Keperawatan, T., Insan, P., Surakarta,
H., & Tengah, J. (2025). Manajemen
nyeri farmakologi pada pasien pasca
pembedahan Open Reduction Internal
Fixation (ORIF) ekstremitas atas
dengan general anestesi. *Vitamin*
Jurnal Ilmu Kesehatan, 11(1).
[https://journal.arikesi.or.id/index.php](https://journal.arikesi.or.id/index.php/Vitamin/article/view/1456)
[/Vitamin/article/view/1456](https://journal.arikesi.or.id/index.php/Vitamin/article/view/1456)