

DOI: DOI: 10.30644/rik.v15i2.1198

Convenience and suitability of multimedia fracture care

Diah Merdekawati¹, Rasyidah AZ²

^{1,2}Nursing Science Study Program, Harapan Ibu College of Health Sciences Jambi, Indonesia

*Corresponding author's email: zelyveliva@gmail.com

Accepted: 15 March 2026; revision: 18 April 2026; published: 31 May 2026

Abstract

Background: Pain and anxiety are major issues for fracture patients, both in the preoperative and postoperative periods. Long nurse contact time is the cause of nurses' concern in overcoming these problems. Although nurses' ability to provide services to fracture patients is undeniable, nurses must be aware of the need for screening and management of pain and psychology. The study aims to ascertain nurses' assessment of the comfort and suitability of multimedia fracture care.

Method: This study uses a research and development (R & D) design through a modification of the Borg & Gall development with 3 stages of testing, namely expert testing, limited trials, and field trials, using incidental sampling techniques with 206 respondents consisting of 3 multimedia experts and 203 nurses who work in handling fractures. The instrument in this study is the result of the development of the Learning Object Review Instrument (LORI) version. Field trials, limited trials, and expert testing all produced flawless results when evaluating the suitability and comfort of multimedia fracture care.

Results: This multimedia application received excellent marks from experts, limited samples and field test samples

Conclusion: The application received an excellent rating from the majority of the respondents, and it can be used as a learning tool for nurses who are providing services to clients who have fractures with accompanying therapy, such as psychoeducation and classical music.

Keywords: Anxiety; fracture; multimedia; pain

INTRODUCTION

Surgery significantly accelerates the healing process following a fracture.(1) This injury is a primary cause of fractures, which are defined as breaks in the continuity of bone and cartilage tissue. Both direct and indirect trauma unequivocally result in fractures.(2) The five most prevalent types of fractures distal radius, proximal femur, ankle, proximal humerus, and metacarpal account for more than half of all fractures.(3) Furthermore, confirm that most long bone fractures occur in the tibia, femur, forearm, humerus, and clavicle.(4)

More rapid fracture healing is often achieved through surgical intervention.(1) The process of fracture healing is a unique repair mechanism that includes both endochondral and intramembranous bone formation, following a specific sequence of

events. Understanding the mechanism of bone healing, along with advancements in technology, is essential for optimizing bone function and addressing healing.(5)

The mortality rate after surgery is high both in the short and long term.(6) The results of observations of perioperative complications, surgical sites, and minor systemic complications overall were 20.0%, 8.1%, and 14.8% of patients.(7) This requires orthopedic surgeons to choose the right strategy to overcome pain and disability while considering comorbidities and patient expectations.(8)

The most important aspects of perioperative management include proper pain management, early mobilization, thorough fluid management, prevention of delirium, and choice of operative treatment depending on comorbidities, demands, and

biology rather than chronological age.(9) A meta-analysis found that timely surgery can lead to significant reductions in length of stay, pain, time out of bed, and hospitalization costs, as well as high levels of satisfaction with nursing care.(10)

The connection between anxiety and pain. The study recommends that hospitals carry out interventions related to pain so that client anxiety will also be reduced.(11) Nursing interventions that can be given to fracture patients are proven through research, which shows that there is a decrease in anxiety in fracture patients after being given music therapy and psychoeducation.(12) The classical music therapy can reduce the level of pain scale in postoperative patients.(13)

The pain scale felt by fracture patients with classical music therapy was smaller compared to those who did not receive music therapy.(14) Anxiety and depression scores can decrease if music is listened to by patients.(15) With an average difference of 3.8, patients in the music intervention group reported significantly lower anxiety scores ($p = 0.008$) than those in the control group. (16)

Nurses have an important role in the interdisciplinary team because they are the largest group of health professionals, working 24 hours a day and spending a lot of time at the patient's bedside.(17) There need to be an update of scientific knowledge for nurses that can be improved through the learning process.

Multimedia education can improve service providers' perceptions of knowledge and confidence.(18) Interactive multimedia e-books effectively enhance nursing students' knowledge and competencies. This method can be used as complementary material in nursing education, internship guidance, and nursing education in the workplace.(19) Multimedia learning resources can achieve learning outcomes regarding basic nursing care, basic physical assessment skills, and clinical reasoning.(20)(21)

Based on the background above, the importance of providing education to nurses on how to care for fracture clients with physical and psychological problems, the researcher is interested in conducting

research on multimedia fracture care as a learning medium.

METHOD

In the research, this procedure development used is the model development, Borg and Gall. Research development or Research Development According to Borg & Gall, it consists of the following steps: steps or procedures used in product development or refinement rework of an existing product. In the study, this product was produced, namely, multimedia: a web-based application about holistic fracture wound care. As for the structure stages of development research, there are 6 stages: study introduction, planning, web-based application creation, expert testing, limited trials, and field trials. The sampling technique is done by incidental sampling.

The instrument used in this study was an assessment sheet of the suitability and convenience of using the Android application. This instrument is the result of the development of the Learning Object Review Instrument (LORI) version 1.5. The implementation stage of the study used the 4D model (Define, Design, Develop, Disseminate). In detail, it can be explained as follows: (a) Define, researchers identify problems in fractured clients and analyze the situation and management obtained by clients and the nurse's ability to overcome the physical and psychological problems of clients. Pain and anxiety are the main problems felt by clients, nurses must have the skills and strategies to overcome them. Medical surgical nurses who care for fracture clients are appropriate respondents in this study; (b) Design, researchers make recordings related to wound assessment, pain, and anxiety and wound care procedures through video. Then the video will be entered into the application. Respondents can see and study demonstrations of client fracture care in the application. Apart from that, the application is equipped with standard operational procedures, starting from assessing anxiety and pain, how to provide complementary classical music therapy and psych education to deal with pain and anxiety,

how to carry out fracture treatment, to how to document activities. Furthermore researchers create a sampling frame to determine the population that has the potential to become respondents. Previously, researchers conducted ethical tests through the ethics commission; (c) Develop, after obtaining permission from the research location and obtaining potential respondents, the researcher can provide informed consent for the respondents' willingness, after which the researcher conducts expert tests, limited trials, and field trials. Expert tests were carried out by multimedia experts, limited trials were carried out on medical surgical specialist nurses and field trials were carried out on executive nurses who provide care to fracture clients. Each test result is first evaluated and the application is corrected before continuing with the next test; (d) Disseminate, the improved application will be promoted or given in a seminar to nurses. This activity was attended by the hospital management so that it could be applied in the care of fracture clients in hospital.

RESULTS

Three experts and 203 nurses comprised the study's 206 respondents (50 for limited trials and 153 for field trials). The results of the study can be seen as follows:

1. Respondent Characteristics

Table 1. Characteristics of Respondents by Gender and Length of Employment (n=206)

Characteristics	Experts (n = 3)		Limited Trial (n = 50)		Field Trial (n=153)	
	Amount	%	Amount	%	Amount	%
Gender						
Man	3	100	17	34	46	30,1
Woman	0	0	33	66	107	69,9
Length of work						
Long	3	100	36	72	86	56,2
New	0	0	14	28	67	43,8

The data analysis revealed that the majority of respondents were female and had extensive work experience, typically over two years.

2. The results of the multimedia expert/expert test analysis can be seen in the following table:

Table 2. Multimedia Experts' Multimedia Evaluation of Fracture Treatment (n=3).

No	Assessment Items	Assessment Results (%)				
		Very less	Not good	Enough	Good	Very well
1	Quality of content/material	0	0	0	0	100
2	uitability of learning objectives	0	0	0	0	100
3	eedback and adaptation	0	0	0	(33.3	66.7
4	lotivation	0	0	0	66.7	33.3
5	resentation design	0	0	0	(33.3	66.7
6	ase of access	0	0	0	0	100
7	ises of interaction	0	0	0	(33.3	66.7
8	tility	0	0	0	0	100
9	leet the standards	0	0	0	33.3	66.7

The application is deemed appropriate for use as the expert evaluation of multimedia fracture treatment has yielded a rating classified as good to very good. The results of the analysis showed that almost all experts only gave good scores to the motivational items that contained the ability to motivate and attract the attention of nurses. Experts

hope that videos can be recorded directly on fracture clients who experience pain and anxiety. Considering the situation and conditions of the hospital, experts stated that this application is worthy of being continued in further testing.

3. The results of the limited trial analysis can be seen in the following table:

Table 3. Multimedia Assessment of Fractures via Limited Trial (n = 50)

No	Assessment Items	Assessment Results (%)				
		Very less	Not good	Enough	Good	Very well
1	Quality of content/material	0	0	0	8.5	91.5
2	Suitability of learning objectives	0	0	0	9.2	90.8
3	Feedback and adaptation	0	0	5.2	54.9	39.9
4	Motivation	0	0	3.3	51	45.7
5	Presentation design	0	0	2	58.2	39.8
(6)	Ease of access	0	0	0	50.3	49.7
(7)	Uses of interaction	0	0	2	50.3	49.7
(8)	Utility	0	0	3.9	45.8	50.3
(9)	Fulfill the criteria	0	0	2	59.5	38.5

The analysis of the limited trial concluded that six out of nine assessment items had a very good average percentage. This indicates that when providing fracture care, multimedia is thought to be both comfortable and suitable for nurses' needs. However, some limited trial respondents only gave sufficient value to the research design; this is because the application is designed separately and is not a hospital program. In

addition, the usefulness of the application also has a sufficient range because the respondents' expectations of the application can be used by nurses in different work environments. However, respondents stated that this application is worthy of being continued in the next test.

4. The following table displays the findings of the analysis of the field trial:

Table 4. Multimedia Assessment of Fractures through Field Trials (n = 153)

No	Assessment Items	Assessment Results (%)				
		Very less	Not good	Enough	Good	Very well
1	Quality of content/material	0	0	0	12	88
2	Suitability of learning objectives	0	0	0	14	86
3	Feedback and adaptation	0	0	2	46	52
4	Motivation	0	0	2	26	72
5	Presentation design	0	0	4	52	44
6	Ease of access	0	0	2	54	44
(7)	Uses of interaction	0	0	0	46	54
(8)	Utility	0	0	4	42	54
(9)	Fulfill the criteria	0	0	2	54	44

Over half of the participants felt that multimedia fracture care was suitable and comfortable for patients with fractures, according to the results of the field trial.

DISCUSSION

Learning is defined as the process of creating an environment that allows the learning process to occur. The process of acquiring, measuring, and maintaining technological literacy in nursing is still lacking. Studies are needed to change technology to a higher level, including problem-solving and critical thinking.(22) Web-based learning has higher effectiveness when compared to the

control group on the subscales of expectations, achievement, and usefulness of the critical thinking motivation scale(23)

The use of learning media is useful for conveying learning content because it can stimulate the attention, interests, feelings, and thoughts of participants.(24) Multimedia-based learning is one of the means of the learning process. That multimedia can facilitate the construction of knowledge and improve learning outcomes.(25) Utilizing sophisticated and modern technology significantly improves patient care and ensures safety at home.(26)

The role of the nurse is a health worker who has a great contribution to carrying out the health service process. The results of study showed that most nurses gave correct statements regarding holistic nursing services, the provision of nursing care, and the task of providing holistic nursing care.(27)

The role of nurses in fulfilling the spiritual needs of patients in the internal medicine and surgical inpatient wards was 50.0% in the good category.(28) Most clinical nurses have moderate spiritual care competencies. Objective factors identified as influencing the spiritual care competencies of clinical nurses.(29)

Video-based digital interventions combined with education are an ideal form of intervention for patients.(30) Mobile phone interventions such as web-based applications have an impact on nurses' knowledge, attitudes, and practices.(31) The increase in nurses' knowledge is greater with multimedia-based learning.(32) In addition, mobile education applications can improve self-care behavior in patients undergoing intervention.(33)

A fracture is a disruption of the normal continuity of a bone.(34) Fracture is a disruption of the continuity of cartilage and growth plates caused by trauma and non-trauma.(35) Holistic assessment of the patient is an important part of providing care for fracture patients rather than focusing only on the physical.(36)

Holistic care for fracture clients must be adjusted to the patient's condition, causative activity, anatomical location, and severity of the injury.(37) The experience of stress in fracture patients varies and is multidimensional, consisting of physiological, cognitive, emotional, sociocultural, and environmental aspects.(38)

This multimedia displays standard operating procedures for fracture care accompanied by complementary therapies to reduce pain and anxiety. The forms of therapy are classical music and psychoeducation. A meta-analysis of 38 RCT articles with a total of 5601 participants provides evidence to support that classical music relieves pain in both psychological and physiological

domains. Consistent music style and good auditory experience in music interventions can overcome pain.(39)

Music significantly affects vital parameters such as lowering heart rate, blood pressure, respiration, and reducing pain intensity. The results of the analysis showed that music affects anxiety levels, reduces sleep disturbances and delirium events, and improves cognitive function. Studies have shown that music reduces anxiety in confused patients, improves mood, and facilitates communication.(40) Music therapy within the scope of non-pharmacological complementary therapies can be provided by healthcare providers, considering that patients do not experience side effects or additional costs and thanks to its ease of implementation.(41)

Three forms of psychological intervention include relaxation, psychoeducation, and behavioral modification therapy. Research shows that the combination of psychological therapy with opioid use can reduce pain.(42) Brief psychological interventions can contribute to reduced length of stay and hospitalization for people experiencing pain-related distress in the hospital.(43)

CONCLUSIONS

The results of this study indicate that most respondents gave the application an excellent rating. The application can be used as a learning medium for nurses in providing services to clients with fractures holistically by addressing pain and anxiety in fracture patients. In addition, this application contains standard operating procedures for fracture care that can be used as a guideline by nurses in providing services to fracture patients.

ACKNOWLEDGMENT

Thanks to the multimedia experts and surgical nurses who participated in this research.

ETHICAL APPROVAL

This study was approved by the ethics committee Jambi Ministry of Health Polytechnic (approval number LB.02.06/2/0035/2024).

REFERENCES

- (1). Laarschot DM Van De, Mckenna MJ, Abrahamsen B, Langdahl B, Cohen-solal M, Guañabens N, et al. Medical Management of Patients After Atypical Femur Fractures: a Systematic Review and Recommendations From the European Calcified Tissue Society. 2020;105(May):1682–99.
- (2) Sjamsuhidajat. Buku Ajar Ilmu Bedah (4th ed.). 2017. Jakarta: EGC.
- (3) Bergh C. Fracture incidence in adults in relation to age and gender : A study of 27 , 169 fractures in the Swedish Fracture Register in a well-de ned catchment area. 2025;1–12.
- (4) Nicholson JA, Makaram N, Simpson A, Keating JF. Fracture nonunion in long bones : A literature review of risk factors and surgical management R. Injury [Internet]. Elsevier Ltd; 2021;52:S3–11. Available from: <https://doi.org/10.1016/j.injury.2020.11.029>
- (5) Einhorn TA. The Science of Fracture Healing. 2005;19(10):19–21.
- (6) Gundel O, Thygesen LC, Gögenur I, Ekeloef S. Postoperative mortality after a hip fracture over a 15-year period in Denmark : a national register study. 2020;91(1):58–62.
- (7) Watanabe T, Kanayama M, Takahata M, Oda I, Suda K, Abe Y, et al. study. 2020;32(April):622–30.
- (8) Ambrosio L, Vadalà G, Russo F, Papalia R, Denaro V. The role of the orthopaedic surgeon in the COVID-19 era : cautions and perspectives. Journal of Experimental Orthopaedics; 2020;5.
- (9) Res JM, Fischer H, Maleitzke T, Eder C, Ahmad S, Stöckle U, et al. Management of proximal femur fractures in the elderly : current concepts and treatment options. Eur J Med Res [Internet]. BioMed Central; 2021;1–15. Available from: <https://doi.org/10.1186/s40001-021-00556-0>
- (10) Jiang M, Liu S, Deng H, Liang X, Bo Z. The efficacy and safety of fast track surgery (FTS) in patients after hip fracture surgery : a meta-analysis. Journal of Orthopaedic Surgery and Research; 2021;1–24.
- (11) Yazid, B. & Situmorang T. Relationship between Pain Level and Anxiety Level in Post-Fracture Surgery Patients at Sundari Hospital, Medan. Flora Nurs J. 2020;13(2):63–71.
- (12) Merdekawati, D., Sagiran, S. & Khoiriyati A. Effectiveness of Psychoeducation Therapy and Murattal Therapy on Anxiety of Preoperative Fracture Patients in the Surgical Treatment Room of Raden Mattaher Regional Hospital, Jambi. IJNP. 2016;3(1):29–34.
- (13) Astuti, A. & Merdekawati, D. Influence of Classical Music Therapy on Pain Scale Reduction of Post-Operative Patients. Journal of Applied HEIs: 2016. 10(3); 148-154.
- (14) Orak Y, Murat S, Yaylali A, Inanc F. Efeitos da musicoterapia sobre dor e estresse oxidativo , ão folicular : estudo clínico randomizado & na aspirac. Brazilian J Anesthesiol [Internet]. Sociedade Brasileira de Anestesiologia; 2020;70(5):491–9. Available from: <https://doi.org/10.1016/j.bjan.2020.04.015>
- (15) Anđın AD, Oruç MA, Öktem A, Türkan G, Sakin O, Gün İ, et al. The effect of music on pain and anxiety in episiotomy müziđin epizyotomideki ağrı ve anksiyeteye etkisi. 2020;(3):541–52.
- (16) Akin, M.E. Effect of music on anxiety and pain during ultrasound-guided core needle breast biopsy: a randomized controlled trial. Diagn Interv Radiol 2021. 27:360–365. <https://doi.org/10.5152/dir.2021.20132>
- (17) Hommel A, Magnéli M, Samuelsson B, Schildmeijer K, Sjöstrand D, Göransson KE, et al. International Journal of Nursing Studies Exploring the incidence and nature of nursing-sensitive orthopaedic adverse events : A multicenter cohort study using Global Trigger Tool. Elsevier Ltd; 2020;102.
- (18) Ahmed ST, Yang C, Deng J, Bottalico

- DM, Matta-arroyo E, Cassel-choudhury G, et al. Implementation of an Online Multimedia Pediatric Tracheostomy Care Module for Healthcare Providers. 2021;1–9.
- (19) Chang T, Teng Y, Chien S, Tzeng Y. *Journal of Nurse Education Today* [Internet]. *Nurse Education Today*; 2021;104883. Available from: <https://doi.org/10.1016/j.nedt.2021.104883>
- (20) Egilsdottir HÖ, Heyn LG, Brembo EA, Byermoen KR, Moen A, Eide H. The value of a redesigned clinical course during COVID-19 pandemic: an explorative convergent mixed-methods study. *BMC Nurs* [Internet]. *BioMed Central*; 2022;1
- (21) Nesbit, John & Belfer, Karen & Leacock, Tracey. (2007). *Learning Object Review Instrument (LORI) User Manual v 1.5*. [Online]. Tersedia: <http://www.transplantedgoose.net/gradstudies/educ892/LORI1.5.pdf>
- (22) Nes G, Steindal SA, Larsen MH, Heer HC, Lærum-onsager E, Gjevjon ER. Technological literacy in nursing education: A scoping review. 2021;37(August 2020):320–34.
- (23) Bilik, O., Kankaya, E.A., Devenci Z. Effects of web-based concept mapping education on students' concept mapping and critical thinking skills: A double blind, randomized, controlled study. *Nurse Educ Today*. 2020;86.
- (24) The role of multimedia in learning. In *Proceedings of the Seminar and Discussion of Elementary Education*. Namiroh, S., Sumantri, MS, & Situmorang, R.
- (25) Khasanah, DN, & Pratiwi A. Khasanah, DN, & Pratiwi, AE. *Proc Natl Semin KSDP S1 PGSD Study Progr "Constellation Indones Educ Cult Era Glob*. 2018;
- (26) Shahrestanaki SK, Amrollah Z, Kohne M, Ghezleleh TN. *Nursing Practice Today* 2024; 2024;11(3):201–3.
- (27) Syahbana A. The Role of Nurses in Carrying Out Holistic Nursing Services for the Provision of Nursing Care in the Internal Medicine Room of Genteng Banyuwangi General Hospital. *Digit Repos Univ Jember*. 2018;
- (28) Rizka, S., Pangaribuan, S. J. Description of the Role of Nurses in Fulfilling the Spiritual Needs of Patients in the Internal Medicine and Surgery Inpatient Room of Madani Hospital, Palu. *Collab J Sci*. 2023;6(12).
- (29) Hsieh, S., Hsu, L., Kao, C., Breckenridge-Sproat, S., Lin, H., Tai, H., Huang, T., Chu T. Factors associated with spiritual care competencies in Taiwan's clinical nurses: A descriptive correlational study. *J Clin Nursing*. 2019;29(9).
- (30) Ghozali MT. Is integrating video into tech-based patient education effective for improving medication adherence? – A review. 2023;
- (31) Fithriyyah, Y. N., Aulawi, K. Using mobile phone applications in engaging nurses for preventing healthcare-associated infections: A systematic review. *Nursing Practice Today*; 2022. 9(2): 84-101. <https://10.18502/npt.v9i2.8892>
- (32) Hsu Y, Chang T, Chu C, Hung S, Wu C, Yeh T. Effectiveness of Multimedia-Based Learning on the Improvement of Knowledge, Attitude, and Behavioral Intention toward COVID-19 Prevention among Nurse Aides in Taiwan: A. 2022;
- (33) Salavati, K., Rejeh, N., Rohani, F., Nayeri, A.D. The effect of education through a mobile application on self-care behavior in patients undergoing percutaneous coronary: A randomized clinical trial. *Nursing Practice Today*: 2024. 11(3): 272-282 <https://10.18502/npt.v11i3.16174>
- (34) Black, J.M. & Hawks, J.H. *Keperawatan Medikal Bedah: Manajemen Klinis Untuk Hasil yang Diharapkan*. 2014. Jakarta: Salemba Medika.
- (35) Apley, A. G. and Solomon L. *System of Orthopaedics and Trauma: Principles of Fractures*. 10th ed. Florida: CRS Press; 2017.
- (36) Craig, J., Clarke, S., Moore P. *Principles of Fracture Management*. In 2017.
- (37) Miller, T. L., Best TM. Taking a holistic approach to managing difficult stress

- fractures. *J Orthop Surg Res.* 2016;11(98).
- (38) MCQueen, S., Mobilio, M.H., Moulton C. Fractured in surgery: Understanding stress as a holistic and subjective surgeon experience. *Am J Surg.* 2021;221(4):793–8.
- (39) Ting B, Tsai C, Hsu W, Shen M, Tseng P, Chen DT, et al. Music Intervention for Pain Control in the Pediatric Population : A Systematic Review and Meta-Analysis. 2022;1–18.
- (40) Lorek M, Dominika B. The Effect of Music as a Non-Pharmacological Intervention on the Physiological , Psychological , and Social Response of Patients in an Intensive Care Unit. 2023;
- (41) Celik, G.O., Guzelcicek, A., Celik S. The Effects of Music Therapy on Patients With Coronary Artery Disease Before the Invasive Procedure: A Randomized Controlled Study. *J Perianesthesia Nurs.* 2022;37(2):194–8.
- (42) Gorsky, K., Black, N.D., Saripella, A., Englesakis, M., Leroux, T., Chung, F., Niazi AU. Psychological interventions to reduce postoperative pain and opioid consumption: a narrative review of literature. *BMJ J.* 2020;46(10).
- (43) Jepegnanam, C., Bull, E., Malpus Z. The role of the psychologist in the inpatient pain service: development and initial outcomes. *Br J Pain.* 2020;15(2).