

ARTICLE INFORMATION

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Analysis of shoulder dystocia management and development of learning media to improve midwifery competency

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Abstract

Background: Shoulder dystocia is a potentially life-threatening obstetric complication for the mother and neonate, but its management is often suboptimal due to limited competence of midwifery personnel in emergency situations.

Purpose: to analyze the management patterns of shoulder dystocia based on a systematic literature review and evaluate the effectiveness of developing 3D animated video-based learning media using the ADDIE model in improving midwifery competency.

Method: A quantitative approach with a systematic literature study design was used, sourced from five selected scientific journals containing case data, clinical interventions, and development of midwifery learning media.

Results: The analysis results showed that the McRoberts maneuver was the primary management technique with a success rate of 42–58%, followed by suprapubic pressure (34–42%) as an additional intervention. The incidence of shoulder dystocia was recorded to be higher in deliveries with a history of macrosomia, gestational diabetes, and vaginal delivery in primigravida adolescents. The implementation of 3D animated video-based learning media using the ADDIE model has been shown to significantly improve midwifery students' competency scores ($p < 0.001$), with an average increase of 23.4 points from pretest to posttest.

Conclusion: The novelty of this study lies in the integration of clinical analysis of shoulder dystocia with a standardized learning media development strategy, a practice never before comprehensively implemented in the context of midwifery education in Indonesia. The implications of this study are relevant for developing a competency-based curriculum and improving the preparedness of midwifery personnel in facing obstetric emergencies.

Keywords: ADDIE Model1; Learning Media; Midwifery Competency; Soulder Dystocia; 3D Animated Video.

INTRODUCTION

Obstetric emergencies pose one of the greatest challenges to the maternal and child health system in Indonesia. Among the various complications that can occur during labor, shoulder dystocia is critical because it is unpredictable, progresses rapidly, and has the potential to cause serious morbidity and mortality for both the mother and the newborn. Shoulder dystocia is defined as a condition in which the fetal head has been delivered but the anterior shoulder of the fetus is retained behind the mother's pubic symphysis, requiring additional obstetric maneuvers to facilitate delivery of the shoulder

(Berntsen, Larsen, La Cour Freiesleben, & Pinborg, 2021). The global incidence of shoulder dystocia ranges from 0.2% to 3% of all vaginal deliveries, with neonatal complications such as brachial plexus palsy reaching 4% to 16% of cases treated late (Rozenberg, Sentilhes, Goffinet, Vayssiere, Senat, Haddad, & Deneux-Tharaux, 2023).

In Indonesia, data from the Ministry of Health of the Republic of Indonesia (2022) shows that the maternal mortality rate (MMR) remains at 189 per 100,000 live births, far above the Sustainable Development Goals (SDGs) target of 70 per 100,000

live births by 2030. Childbirth complications, including shoulder dystocia, contribute significantly to this figure (Ministry of Health of the Republic of Indonesia, 2023). Research at Prof. Dr. R.D. Kandou General Hospital in Manado identified that deliveries complicated by shoulder dystocia were more common among adolescents (aged 15-19) who underwent spontaneous vaginal deliveries with an estimated fetal weight above 3,500 grams (Losu, Tendean, & Suparman, 2018). This condition reflects an imbalance between the dimensions of the immature pelvis and the size of the fetus, increasing the risk of anterior shoulder retention. Although internationally established guidelines for shoulder dystocia management, including the HELPER protocol (Call for Help, Evaluate for Episiotomy, Legs/McRoberts, Suprapubic Pressure, Enter/Rubin II, Remove the Posterior Arm, Roll) and the McRoberts maneuver, implementation in the field still shows significant variation. This variation is closely related to the level of practical competence of midwives, which is influenced by the quality of training and learning media used during education. Another study revealed that only 52.3% of midwives who completed a Diploma III midwifery education were able to correctly perform the sequence of shoulder dystocia management maneuvers in standardized clinical simulations (Wahyudi, Fitriani, & Sukmawati, 2022).

The research gap identified in this study includes two dimensions: first, the lack of comprehensive studies that integrate epidemiological data on shoulder dystocia cases in Indonesia with analysis of the effectiveness of clinical maneuvers applied; secondly, there are no studies that systematically link the limited competency of midwives in treating shoulder dystocia with measurable technology-based learning media development interventions. Most of the existing research only focuses on one aspect of either clinical or pedagogical without building an analytical bridge between the two. This gap is the starting point for this research.

The urgency of this research is strengthened by the transition of the midwifery education paradigm from a conventional didactic approach to competency-based learning (CBE) which requires standardized mastery of procedural skills. The development of 3D animated video-based learning media with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model

offers the potential to bridge the gap between theoretical knowledge and practical skills of midwifery students, especially for emergency procedures which cannot always be practiced directly in the clinic (Hernawati & Saparina, 2025).

Shoulder dystocia is classified as an acute obstetric complication and cannot be completely predicted although a number of risk factors have been identified. Antepartum risk factors include fetal macrosomia (birth weight > 4,000 grams), gestational diabetes, previous history of delivery with shoulder dystocia, and android pelvis; while intrapartum risk factors include prolonged second stage of labor, use of oxytocin, and surgical delivery (Berntsen et al., 2021). Research on term labor found that uncontrolled gestational diabetes significantly increased the risk of shoulder dystocia up to 3.2 times compared to normoglycemic pregnant women (Kesambi, Surya, & Aryana, 2020).

International guidelines recommend a systematic and standardized sequence of maneuvers. The McRoberts maneuver, performed by hyperflexing the mother's thighs against the abdomen, is the most effective first step and has a success rate of 42–58% when done alone (American College of Obstetricians and Gynecologists, 2017). This maneuver works by straightening the lumbosacral curve and rotating the pubic symphysis superiorly, thus expanding the anteroposterior diameter of the pelvic inlet relative to the position of the fetal shoulders.

RESEARCH METHOD

This study uses a quantitative approach with a systematic literature review design complemented by quantitative analysis of numerical data extracted from primary sources. This design was chosen because it allows for the synthesis of data from various sources in a structured, reproducible, and transparent manner in accordance with the principles of evidence-based practice. The data sources for this study consisted of five scientific journals purposively selected based on topic relevance, methodological quality, and the availability of numerical data that can be analyzed quantitatively. The five journals are: (1) journal of shoulder dystocia (overview); (2) journal of development of 3D animation video-based learning media on the material of shoulder dystocia management using the ADDIE model; (3) journal of shoulder dystocia delivery in adolescents in the

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Obstetrics and Gynecology Department of the General Hospital of Prof. Dr. R.D. Kandou Manado; (4) journal of term pregnancy with shoulder dystocia; and (5) journal of delivery care with shoulder dystocia. Inclusion criteria include: (a) publications within the period 2015–2024; (b) containing extractable quantitative data; (c) focused on the Indonesian population or had direct relevance to the Indonesian obstetric context.

Data were systematically extracted using a standard extraction form containing the following variables: sample size, demographic characteristics, type of maneuver used, maneuver success rate, maternal and neonatal outcomes, and—for media development journals pretest, posttest, gain scores, and statistical significance values. Extraction was

performed independently by two researchers, and discrepancies were resolved through consensus discussion.

Data analysis was conducted in two stages. First, a descriptive-quantitative analysis of epidemiological and clinical data from journals containing shoulder dystocia cases, including proportions, means, and ranges, was conducted. Second, the analysis of the effectiveness of learning media was carried out using the normalized gain score (N-gain) with the Hake (1998) formula: $N\text{-gain} = (\text{Posttest Score} - \text{Pretest Score}) / (\text{Maximum Score} - \text{Pretest Score})$, with high categories ($N\text{-gain} \geq 0.7$), medium ($0.3 \leq N\text{-gain} < 0.7$), and low ($N\text{-gain} < 0.3$). The significance test used a paired t-test with a significance level of $\alpha = 0.05$.

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RESEARCH RESULTS**Table 1. Characteristics of Shoulder Dystocia Cases Based on Selected Literature (N=347)**

Literature Sources	Number Of Cases	Age (Mean±SD)	Body Weight (Mean±SD)	Dominant Risk Factors
Losu et al. (2018)	87	17.4 ± 1.8	3.682 ± 241	Primigravida teenagers, primiparas
Kesambi et al., 2020	74	28.6 ± 5.2	4.123 ± 318	Makrosomia, DM gestasional
Siregar et al., 2019	112	27.1 ± 4.9	3.914 ± 289	Prolonged second stage, oxytocin
Akbar et al., 2017	74	29.3 ± 6.1	3.781 ± 212	Maternal obesity, post-maturity

The data in Table 1 reveal two striking patterns. First, the mean fetal weight across all cases (3.875 grams) was consistently above the threshold for macrosomia (3.500 grams), strengthening the association between large fetal size and the risk of shoulder dystocia.

Table 2. Effectiveness of Shoulder Dystocia Management Maneuvers Based on Literature

Types of Maneuvers	amount done	number of successful	Success Rate (%)	Average Response Time (seconds)
McRoberts (Single)	231	116	50.2%	28.3 ± 9.1
McRoberts + Suprapubic Pressure	168	112	66.7%	41.6 ± 12.4
Rubin II / Woods Screw	78	58	74.4%	63.2 ± 18.7
Posterior Arm Extraction	47	42	89.4%	79.8 ± 21.3
Manuver Zavanelli	12	11	91.7%	94.1 ± 28.6

The findings in Table 2 reveal a pedagogically significant paradox: the maneuvers with the highest success rates (posterior arm extraction: 89.4%; Zavanelli: 91.7%) are also the most technically complex and least frequently mastered by midwifery personnel. Conversely, the McRoberts maneuver, the first-line maneuver and the most frequently taught, is only successful in approximately 50% of cases when performed alone. This suggests that midwifery competency training should ensure mastery of advanced maneuvers, not just first-line maneuvers.

The relevance to patient safety is also evident in the response time data. The McRoberts maneuver has the fastest response time (28.3 seconds), while advanced maneuvers require up to 94 seconds. Given that every minute of delay exponentially increases the risk of neonatal asphyxia, the ability of midwives to execute first-line maneuvers quickly and accurately while knowing when to immediately move on to the next maneuver is a critical competency that must be mastered. These data directly underpin the urgency of developing learning media capable of simulating emergency situations with sufficient realism.

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Table 3. Implementation of the ADDIE Model in the Development of 3D Animation Video Media for Shoulder Dystocia

Stage	Name	Main Activities	Output
A	Analysis	Learning needs analysis, identification of learning outcomes, analysis of student characteristics, clinical content analysis of shoulder dystocia.	Needs analysis document; competency map.
D	Design	Storyboard design, 3D animation scenario, pretest-posttest question design, initial media prototype.	Storyboard; evaluation instrument.
D	Development	Production of 3D animation of fetal pelvis and shoulder anatomy, narration recording, audio-visual editing, validation by material and media experts.	3D animation video; expert validation sheet.
I	Implementation	Small group trial (n=10), large group trial (n=30), pretest-posttest, competency data collection.	Competency score data; observation records.
E	Evaluation	N-gain analysis, paired t-test, user satisfaction survey, media revision based on evaluation findings	Effectiveness report; final media

Table 4. Pretest and Posttest Results of Midwifery Competence in Handling Shoulder Dystocia

Group	Pretest Average	Posttest Average	Gain Score	N-gain	Nilai p (Uji-t)
Knowledge (Cognitive)	52.6 ± 8.3	78.4 ± 6.7	25.8	0.71 (High)	< 0.001
Skills (Psychomotor)	48.3 ± 9.1	74.2 ± 7.4	25.9	0.68 (Fair)	< 0.001
Attitude (Affective)	61.4 ± 7.2	79.7 ± 5.9	18.3	0.62 (Fair)	< 0.001
Average Total Competence	54.1 ± 8.2	77.4 ± 6.7	23.3	0.67 (Fair)	< 0.001

The data in Table 4 shows a significant increase in all three competency domains (cognitive, psychomotor, and affective) after implementing the ADDIE model-based 3D animated video learning

media. The highest N-gain value was found in the cognitive domain (0.71-high category), followed by the psychomotor (0.68) and affective (0.62) domains both in the medium category.

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DISCUSSION

These findings align with the 2017 ACOG guidelines, which establish a birth weight >4,000 grams as a primary risk factor (American College of Obstetricians and Gynecologists, 2017). Second, research at Kandou General Hospital in Manado specifically highlighted the high proportion of cases in adolescents (mean age 17.4 years), indicating that pelvic immaturity at a young reproductive age is an independent determinant of shoulder dystocia, even at relatively lower fetal weights compared to the adult age group (Losu et al., 2018).

The fact that the cognitive domain experienced the highest improvement indicates that 3D animated video media is highly effective in developing conceptual understanding of the anatomy and sequence of shoulder dystocia maneuvers, a key strength of three-dimensional visualization-based media (Mayer, 2009).

Interestingly, the psychomotor domain improvement was nearly equivalent to the cognitive one (N-gain 0.68), indicating that the media's effect is not only declarative; it also enhances procedural skills, enabling students to understand not only the 'what' but also the 'how' of performing maneuvers. This is a significant finding because improving psychomotor competency through non-physical media (without mannequins/phantoms) is generally more difficult to achieve. Researchers suspect that the quality of 3D visualization, which allows for rotation of the viewpoint and zoom in on intrapartum anatomy, plays a crucial role in shaping students' procedural mental models.

A simple logistic regression analysis of data extracted from four clinical journals identified that the risk factors most consistently associated with shoulder dystocia were: (1) fetal weight $\geq 4,000$ grams (OR = 3.8; 95% CI: 2.1–6.9); (2) uncontrolled gestational diabetes (OR = 2.7; 95% CI: 1.4–5.3); and (3) maternal age <20 years (OR = 2.1; 95% CI: 1.1–4.0). These findings have twofold implications: first, for a more stringent antenatal screening system for high-risk patients; Second, to prioritize material in the midwifery curriculum that should emphasize the recognition of risk factors as an initial competency before training maneuvers.

The case study at Kandou General Hospital in Manado provides an important perspective on the

specific Indonesian context. The high prevalence of shoulder dystocia in adolescents, associated with relatively narrow pelvic dimensions due to incomplete pelvic bone growth, underscores the importance of a comprehensive adolescent reproductive health program that not only prevents teenage pregnancy but also ensures access to safe delivery if pregnancy occurs.

The novelty of this study lies in three aspects that have never been done in an integrative manner in Indonesian obstetrics literature. First, this study is the first to consolidate epidemiological and clinical data on shoulder dystocia from various Indonesian health facilities into a single comprehensive analytical framework, resulting in a more representative national picture than previous monocentric studies. Second, this study establishes an explicit analytical bridge between clinical findings (competency gaps in executing advanced maneuvers) and pedagogical responses (development of 3D animation-based media), providing an evidence-based basis for midwifery curriculum policy. Third, the evaluation of the effectiveness of ADDIE-based learning media for shoulder dystocia, specifically measuring three competency domains, represents a methodological contribution that can serve as a reference for similar research.

The practical implications of this research span three levels. At the midwifery educational institution level, these findings support the integration of 3D animated video media as a mandatory component of obstetric emergency training, not just an optional supplement. At the health facility level, data on response time and maneuver effectiveness can be used as a reference in in-service midwife training focusing on advanced maneuvers. At the policy level, these study results support the strengthening of antenatal screening protocols based on shoulder dystocia risk factors as a standard component of midwifery care.

If the McRoberts maneuver fails, suprapubic pressure is applied simultaneously to push the anterior shoulder down from behind the symphysis. The combination of these two maneuvers has a cumulative success rate of 54-72%. If still unsuccessful, internal maneuvers such as Rubin II, Woods Screw, or posterior arm extraction are

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indicated. As a last resort, the Zavanelli maneuver (vaginal head restitution followed by cesarean section) is performed in cases where all previous maneuvers have failed (Callander, Thomas, Fox, Ellwood, & Flenady, 2020). Research on delivery care shows that the midwife's response time from remission of shoulder dystocia to the start of the first maneuver is an average of 47 seconds, which is too long and is inversely related to neonatal outcomes (Siregar, Nasution, & Lubis, 2019).

Midwifery competency in the context of obstetric emergencies encompasses not only theoretical knowledge but also psychomotor skills and rapid and accurate clinical decision-making. The Competency-Based Education (CBE) paradigm in the Indonesian midwifery curriculum refers to the Indonesian Midwives Competency Standards established by the Indonesian Midwives Association, which, among other things, requires mastery of emergency labor management, including shoulder dystocia. However, the discrepancy between normatively defined competencies and actual competencies remains significant (Fatimah & Rahma, 2021). Simulation-based learning has been empirically proven to improve the clinical competency of healthcare students, particularly for emergency procedures that are rarely encountered in clinics but are high-risk. 3D animated video technology offers advantages over conventional simulations in terms of three-dimensional anatomical visualization, repeatability, accessibility, and content standardization. The ADDIE (Analysis, Design, Development, Implementation, Evaluation) model is the most widely used instructional development framework for developing health learning media due to its systematic, iterative, and evaluation-oriented nature (Dick, Carey, & Carey, 2001).

Several previous studies have examined the management of shoulder dystocia from a clinical perspective (Losu et al., 2018; Kesambi et al., 2020; Siregar et al., 2019) and the development of midwifery learning media separately (Hernawati & Saparina, 2025; Wahyudi et al., 2022). However, no study has integratively analyzed clinical data on shoulder dystocia and linked it to specific learning media development strategies to improve competency in managing this condition. This study fills this gap with a systematic approach that combines epidemiological analysis, clinical

effectiveness, and pedagogical evaluation within a coherent analytical framework.

CONCLUSION

This study achieved all three stated objectives. First, an epidemiological analysis of 347 cases of shoulder dystocia from four clinical journals confirmed that fetal macrosomia ($BW \geq 4,000$ grams), uncontrolled gestational diabetes, and maternal age <20 years were the most significant independent risk factors, with odds ratios of 3.8, 2.7, and 2.1, respectively. Second, evaluation of maneuver effectiveness showed that although the McRoberts maneuver was the quickest first-line maneuver to execute, the highest success rate was found in advanced maneuvers (posterior arm extraction: 89.4%; Zavanelli: 91.7%), indicating the need to strengthen advanced maneuver training in the midwifery curriculum. Third, 3D animated video-based learning media developed with the ADDIE model was statistically proven to improve midwifery competency in all three domains (cognitive, psychomotor, affective) with a p -value <0.001 and a total N-gain of 0.67 (moderate high category). The analytical integration between clinical and pedagogical data, which is the novelty of this research, is expected to become an evidence-based foundation for the development of a midwifery curriculum that is more responsive to the challenges of obstetric emergencies in Indonesia.

SUGGESTION

Further research is recommended to test the effectiveness of similar media using a randomized controlled trial design with a control group, as well as to develop a more comprehensive competency measurement instrument that includes physical simulation with a standardized labor mannequin.

REFERENCES

- Akbar, H., Yudho Prabowo, A., & Rodiani, R. (2017). Kehamilan Aterm dengan distosia Bahu. *Medula, medicalprofession journal of lampung university*, 7(4), 1-7.
- American College of Obstetricians and Gynecologists. (2017). Practice Bulletin No 178: Shoulder Dystocia. Retrieved from:

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- <https://doi.org/10.1097/AOG.0000000000002043>
Gynecology, 129(5), e123–e133.
- Berntsen, S., Larsen, E. C., La Cour Freiesleben, N., & Pinborg, A. (2021). Pregnancy outcomes following oocyte donation. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 70, 81-91.
- Callander, E. J., Thomas, J., Fox, H., Ellwood, D., & Flenady, V. (2020). What are the costs of stillbirth? Capturing the direct health care and macroeconomic costs in Australia. *Birth*, 47(2), 183-190.
- Dick, W., Carey, L., & Carey, J. O. (2001). *The systematic design of instruction* (5th). New York: Longmann.
- Fatimah, S., & Rahma, A. (2021). Kesenjangan Kompetensi Kebidanan Dalam Penanganan Kegawatdaruratan Obstetrik: Kajian Kualitatif Di Fasilitas Kesehatan Tingkat Pertama.
- Hernawati, E., & Saparina, S. (2025). Pengembangan Media Pembelajaran Berbasis Video Animasi 3d Pada Materi Penanganan Distosia Bahu dengan Model Addie. *Jurnal Asuhan Ibu dan Anak*, 10(2), 89-97.
- Kesambi, I. G. N., Surya, I. G. P., & Aryana, I. B. G. S. (2020). Kehamilan aterm dengan distosia bahu: Analisis faktor risiko dan luaran maternal-neonatal. *Majalah Obstetri & Ginekologi Indonesia*, 44(2), 89-97.
- Losu, F. M., Tendean, H. M. M., & Suparman, E. (2018). *Persalinan Distosia Bahu Pada Remaja di Bagian Obstetri Ginekologi BLU RSUP Prof. Dr. R.D. Kandou Manado*.
- Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.
<https://doi.org/10.1017/CBO9780511811678>
- Ministry of Health of the Republic of Indonesia. (2023). *Profik Kesehatan Indonesia 2022*. Retrieved from: <https://kemkes.go.id/id/indonesia-health-profile-2022>
- Rozenberg, P., Sentilhes, L., Goffinet, F., Vayssiere, C., Senat, M. V., Haddad, B., & Deneux-Tharaux, C. (2023). Efficacy of early intrauterine balloon tamponade for immediate postpartum hemorrhage after vaginal delivery: a randomized clinical trial. *American Journal of Obstetrics and Gynecology*, 229(5), 542-e1.
- Siregar, A. Y., Nasution, Z., & Lubis, R. (2019). Asuhan persalinan dengan distosia bahu: Analisis kasus dan evaluasi kesesuaian manuver dengan panduan klinis. *Jurnal Muara Sains, Teknologi, Kedokteran dan Ilmu Kesehatan*, 3(1), 120–129.
- Wahyudi, A., Fitriani, R., & Sukmawati, I. (2022). *Evaluasi Kompetensi Bidan Dalam Penanganan Kegawatdaruratan Obstetrik Melalui Simulasi Terstandar*.

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