

# Application of Simulated Fractional Curettage in Obstetrics and Gynecology Residency Training

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## Abstract

**Objective:** To evaluate the effectiveness of simulated fractional curettage training for obstetrics and gynecology residents, identify key perioperative deficiencies, and propose optimization strategies for clinical skill education. **Methods:** A retrospective analysis was performed on 36 residents who completed standardized simulated fractional curettage training and assessment from June 2021 to June 2025, with 47 assessment records included. Ten perioperative indicators were scored quantitatively. Residents failing the initial assessment received individualized remedial training and one reassessment. **Results:** The highest failure rates were humanistic patient care (36.2%) and standardized aseptic technique (29.8%). Failure rates for all other items were below 13%. **Conclusion:** Simulated fractional curettage training significantly improves residents' clinical skills and reasoning. Optimizing curricula, strengthening teaching faculty, and integrating VR/AR/AI can further enhance training quality.

## Keywords

Residency Standardized Training, Simulation-Based Medical Education, Obstetrics and Gynecology, Fractional Curettage, Surgical Skills, Humanistic Care

## 1. Introduction

Standardized residency training is the core of postgraduate medical education, designed to cultivate specialists with professional ethics, solid knowledge, and standardized clinical skills [1]. Fractional curettage is a fundamental gynecological procedure for investigating abnormal uterine bleeding and early detection of

endometrial cancer [2].

Traditional training relies heavily on observing real patients and limited hands-on practice, resulting in a long learning curve and increased clinical risks. Simulation training provides a safe, controllable, and reproducible environment to improve skill acquisition and training quality [3]. Existing simulation studies focus mainly on technical performance, with limited attention to humanistic care and aseptic practice. This study evaluates simulated fractional curettage training outcomes and identifies weaknesses to inform residency education.

## 2. Materials and Methods

### 2.1. Study Subjects

Thirty-six residents rotating in the Department of Obstetrics and Gynecology from June 2021 to June 2025 were included. All completed standardized training and assessment, yielding 47 records: 15 residents assessed once, 12 twice, and 2 three times. Two residents failed initially but passed remediation; only initial results were analyzed.

### 2.2. Training and Assessment Protocol

Residents completed one month of rotation training in the gynecological outpatient day ward. A 45-minute lecture on fractional curettage was delivered at orientation. The first week involved clinical observation; weeks 2 - 3 included 20 simulated procedures under certified trainer supervision.

Assessment occurred in the final week. Residents managed a simulated middle-aged woman with acute heavy vaginal bleeding, formulated a diagnosis and plan, and performed fractional curettage. Two qualified attending physicians served as examiners; a third resolved score discrepancies > 15 points. The procedure time limit was 10 minutes.

### 2.3. Assessment Scoring Criteria

A self-designed 100-point rubric was used: Failure < 60; Qualified  $\geq$  60. Ten indicators covered three stages:

Preoperative (20 points): Patient preparation, operator preparation, informed consent.

Intraoperative (40 points): Standardized aseptic technique, surgical steps.

Postoperative (40 points): Specimen submission, medical record writing, postoperative orders, procedure purpose, humanistic care.

Humanistic care included respecting dignity, protecting privacy, relieving anxiety, gentle manipulation, and postoperative guidance.

### 2.4. Ethical Approval

This retrospective study analyzed routine training data without accessing patient privacy, human subjects, or biological samples. Ethical approval was waived.

### 3. Results

**Table 1** presents the scores of resident physicians in various assessment items. **Table 2** shows the number and proportion of candidates who failed each assessment item. Failure rates across 10 indicators: Preoperative: Patient preparation 12.8%, operator preparation 4.3%, informed consent 8.5%. Intraoperative: Aseptic technique 29.8%, surgical steps 4.3%. Postoperative: Humanistic care 36.2%, specimen submission 8.5%, medical records 12.8%, postoperative orders 4.3%, purpose explanation 8.5%. Key weaknesses were aseptic technique and humanistic care.

**Table 1.** Scoring scale for simulated fractional curettage.

Category	Scoring Item	Score	Excellent ( $\geq 80\%$ )	Pass (60% - 79%)	Fail ( $< 60\%$ )
Preoperative	Patient Preparation	5	$\geq 4$	3	$\leq 2$
	Operator Preparation	5	$\geq 4$	3	$\leq 2$
	Informed Consent	10	$\geq 8$	6 - 7	$\leq 5$
Intraoperative	Aseptic Technique	10	$\geq 8$	6 - 7	$\leq 5$
	Surgical Procedures	30	$\geq 24$	18 - 23	$\leq 17$
Postoperative	Specimen Submission	5	$\geq 4$	3	$\leq 2$
	Medical Records	10	$\geq 8$	6 - 7	$\leq 5$
	Postoperative Orders	5	$\geq 4$	3	$\leq 2$
	Surgical Purpose	10	$\geq 8$	6 - 7	$\leq 5$
	Humanistic Care	10	$\geq 8$	6 - 7	$\leq 5$
Total	—	100	—	—	—

**Table 2.** Failure rates in simulated fractional curettage assessment.

Category	Scoring Item	Assessments	Failures	Failure Rate (%)
Preoperative	Patient Preparation	47	6	12.8
	Operator Preparation	47	2	4.3
	Informed Consent	47	4	8.5
Intraoperative	Aseptic Technique	47	14	29.8
	Surgical Procedures	47	2	4.3
Postoperative	Specimen Submission	47	2	4.3
	Medical Records	47	6	12.8
	Postoperative Orders	47	3	6.4
	Surgical Purpose	47	3	6.4
	Humanistic Care	47	17	36.2

### 4. Discussion

This study identified humanistic care (36.2%) and aseptic technique (29.8%) as

the most prominent weaknesses. Aseptic practice underpins surgical safety, while humanistic care reflects professionalism and communication—both core training goals [4].

High-fidelity simulators replicate uterine anatomy and tissue resistance, enabling standardized procedural memory and reducing early clinical anxiety, which is critical in obstetrics and gynecology due to privacy concerns [5] [6]. Simulation also fosters communication and teamwork skills [7].

High failure rates likely stem from overemphasis on technical skills, insufficient training in communication and privacy protection, and weak aseptic awareness. Residents often focus on completing steps but neglect patient-centered care and strict sterile protocols.

Current limitations include high equipment costs, inadequate scenario integration, limited validation of simulation-to-clinical correlation, and a shortage of qualified instructors.

Future directions include VR/AR/AI-enhanced immersive training, multidisciplinary simulation scenarios, evidence-based curriculum validation, and low-cost remote simulation for resource-limited settings [8]-[10].

In conclusion, simulated fractional curettage training improves residents' skills and patient safety. Continuous improvements in technology, curricula, faculty, and resources will maximize simulation benefits and elevate residency training quality.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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