



## RESEARCH ARTICLE

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## Enhancing Psychomotor Skills in Medical Interns: An Evaluation of Training Methods

Gopal Shinde<sup>1</sup>, Yogesh Salphale<sup>2</sup>, Hrishikesh Saodekar<sup>4</sup>, Pritesh Kothari<sup>1\*</sup>, Amol R Patil<sup>3</sup> and Yatnesh Rai<sup>1</sup><sup>1</sup>Department of Orthopaedics, Government Medical College and Maharashtra Postgraduate Institute of Medical Education and Research, Maharashtra University of Health Sciences, Nashik, Maharashtra, India<sup>2</sup>Senior Consultant, Shushrusha Multispecialty Hospital, Chandrapur, Maharashtra, India<sup>3</sup>Department of Community Medicine, Government Medical College and Maharashtra Postgraduate Institute of Medical Education and Research, Maharashtra University of Health Sciences, Nashik, Maharashtra, India

### ABSTRACT

**Background:** Proficiency in psychomotor skills is crucial for medical interns transitioning from theoretical knowledge to practical application. Traditional teaching methods often lack sufficient hands-on experience and critical feedback, resulting in procedural errors and increased healthcare costs. This study evaluates the effectiveness of the Demonstrate-Observe-Assist-Perform (DOAP) method in teaching urinary male bladder catheterization (MBC).

**Methods:** A clinical descriptive longitudinal study was conducted with 40 intern doctors. Participants were initially assessed on traditional urinary catheterization method in male patients. The DOAP method was then employed, involving demonstration, observation, assistance and supervised performance. After three weeks of training and supervised performance, participants were re-evaluated using direct observation of procedural skills (DOPS) method with checklists and questionnaires tool. Statistical analysis performed and compared pre- and post-training proficiency.

**Results:** Significant improvements were observed post-DOAP training. Awareness of critical steps increased from 67.5% to 97.5% ( $p=0.001$ ), confidence in performing MBC rose from 70% to 95% ( $p=0.003$ ) and understanding of the 'No Touch technique' improved from 82.5% to 100% ( $p=0.012$ ). Faculty evaluations showed enhanced ability to perform MBC with all critical steps from 20% to 82.5% ( $p=0.000$ ) and increased counselling skills from 52.5% to 92.5% ( $p=0.000$ ).

**Conclusion:** The DOAP method significantly enhances the psychomotor skills of intern doctors, improving both knowledge, practical performance and communication skills. Integrating DOAP into medical training programs is recommended to enhance clinical competence and patient care quality.

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### Introduction

Proficiency in psychomotor skills is a crucial element of medical training, especially for intern doctors who must transition from theoretical knowledge to practical application. Despite the importance of these skills, many medical graduates struggle to achieve the necessary proficiency, leading to procedural errors, patient complications and increased healthcare costs. Research shows that traditional teaching methods often lack sufficient hands-on experience and critical feedback, resulting in a significant gap between knowledge and practical skills [1,2]. Medical interns often find it challenging to master psychomotor skills due to inadequate training methodologies. For instance, the skill of urinary catheterization, a common and essential procedure, is frequently performed with less-than-optimal proficiency, increasing the risk of complications such as infections and trauma [3]. Studies have demonstrated that while theoretical knowledge can be effectively imparted through traditional methods, the development of psychomotor skills requires a more interactive and practice-oriented approach [4,5].

A significant issue is the absence of structured, hands-on training programs. Traditional medical education predominantly relies on didactic teaching methods, which are insufficient for developing the psychomotor skills necessary for complex procedures [6]. Interns often express a lack of confidence and competence when performing these tasks independently, which can negatively impact patient care and outcomes [7,8].

This study addresses the need for improved training methods by evaluating the effectiveness of the Demonstrate-Observe-Assist-Perform (DOAP) method compared to traditional teaching techniques. The DOAP method emphasizes a structured, hands-on approach, allowing interns to observe, assist and perform procedures under supervision, thereby enhancing skill acquisition and confidence [9,10]. Previous research supports the efficacy of such interactive training methods in improving psychomotor skill development, highlighting the importance of incorporating these techniques into medical education [11,12].

**Contact** Pritesh Kothari, Department of Orthopaedics, Government Medical College and Maharashtra Postgraduate Institute of Medical Education and Research, Maharashtra University of Health Sciences, Nashik, Maharashtra, India.

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Moreover, psychomotor skill development is essential not only for patient safety but also for the professional growth of medical interns. Effective training programs can significantly reduce the incidence of procedural errors and improve the overall quality of care provided by new doctors [12]. Interactive and simulation-based training methods have been particularly effective in bridging the gap between theoretical knowledge and practical application [13,14].

**Materials and Methods**

**Study Design:** This clinical descriptive longitudinal study aimed to evaluate the effectiveness of the Demonstrate-Observe-Assist-Perform (DOAP) method in teaching urinary catheterization to intern doctors. The study was conducted with approval from the institutional ethics committee.

**Participants:** Forty willing intern doctors were enrolled in the study. Inclusion criteria included current intern status and prior exposure to traditional urinary catheterization methods during their medicine posting.

**Procedure:** The study was divided into two phases: initial assessment and DOAP method training.

**Initial assessment**

Participants' proficiency in the traditional method of urinary catheterization was evaluated through direct observation.

Performance was assessed using a checklist of critical procedural steps, which served as the primary outcome variable.

**DOAP Method Training**

**Demonstration:** Faculty demonstrated the complete male urinary catheterization procedure, emphasizing critical steps.

**Observation:** Participants observed the procedure with detailed explanations provided for each step.

**Assistance:** Participants assisted the faculty in performing the procedure, gaining hands-on experience.

**Performance:** Participants performed the procedure independently under supervision.

**Evaluation:** After three weeks of training, participants were re-evaluated for their proficiency in urinary catheterization.

The evaluation included repeated assessments of the procedure, mutual feedback for improvements and final evaluations using the checklist, research questionnaire and direct observation by DOPS method by the faculty.

Short-term outcomes included satisfaction and confidence in procedural skills, assessed using a modified logic model design.

**Data collection and statistical analysis:** Data were collected through direct observation, checklists and questionnaires. The primary outcome measure was the improvement in procedural proficiency, indicated by adherence to critical steps. Secondary outcome measures included participant confidence, satisfaction and reduction of procedural errors. Statistical analysis was performed to compare pre-training and post-training proficiency using appropriate statistical tests (Chi-square test/ Fisher exact test) to determine the significance of improvements. The p value less than 0.05 considered significant.

**Results**

The analysis of the pre-and post-DOAP teaching methods in medical interns revealed significant improvements in various crucial aspects. Following the implementation of DOAP, there were notable enhancements in students' confidence levels regarding performing bladder catheterization (P=0.003). Additionally, there were significant improvements in their awareness of critical steps (P=0.001) and techniques like the 'No Touch technique' (P=0.012). Moreover, students showed an increased understanding of the relationship between MBC theory and skill (P=0.000), along with a heightened recognition of DOAP as an effective teaching method (P=0.000). These results suggest the effectiveness of DOAP in augmenting students' knowledge and skills concerning bladder catheterization, reflecting its positive impact on medical education (Table 1).

**Table 1. Students response: Pre- and post-DOAP skill teaching methods.**

Sr. No.	Question	Pre-DOAP			Post-DOAP		P value
		Observations			Observations		
		Freq.	%		Freq.	%	1
Q1	I am aware that bladder catheterization is a verifiable (essential) skill	Yes	39	97.5	40	100	
		No	0	0	0	0	
		Not sure	1	2.5	0	0	
Q2	MBC was taught to me in Medicine posting during my internship	Yes	39	97.5	40	100	1
		No	1	2.5	0	0	
Q3	I was taught MBC during an internship posting in Medicine by ----method	Traditional	40	100	40	100	0.000
		DOAP	0	0	40	100	
Q4	I am confident in performing the MBC	Yes	28	70	38	95	0.003*
		No	11	27.5	1	2.5	
		Not sure	1	2.5	1	2.5	
Q5	I am aware of the 'No Touch technique' of MBC	Yes	33	82.5	40	100	0.012*
		No	7	17.5	0	0	

Q6	I am aware of the critical steps of MBC	Yes	27	67.5	39	97.5	0.001
		No	13	32.5	1	2.5	
Q7	Do you know the indications and contraindications to MBC	Yes	32	80	38	95	0.102
		No	6	15	2	5	
		Not sure	2	5	0	0	
Q8	Do you know that the DOAP is a method of teaching the skills	Yes	24	60	40	100	0.000
		No	14	35	0	0	
		Not sure	2	5	0	0	
Q9	I know the MBC theory but have no skill	Yes	12	30	2	5	0.000
		No theory No Skill	9	22.5	0	0	
		Knows Both	19	47.5	38	95	

DOAP: Demonstrate-Observe-Assist-Perform, \*: Significant, : Highly Significant

The survey indicates intern doctors' preferences regarding learning Male Bladder Characteristics (MBC) using the DOAP (Demonstrate-Observe-Assist-Perform) method compared to traditional approaches. Frequency and percentage analysis reveal that the majority strongly believe the DOAP method enhances both knowledge and skills related to MBC. Specifically, high frequencies (ranging from 52.5% to 72.5%) demonstrate agreement with the DOAP method's learner-friendly nature and its effectiveness in teaching procedural skills. Conversely, a minimal percentage supports the traditional method. Overall, the data showcases a clear inclination among intern doctors for the DOAP approach, signifying its perceived effectiveness and learner-friendly attributes in comprehending Male Bladder Characteristics (Table 2).

**Table 2. Intern doctor's satisfaction survey.**

Sr. No.	Questionnaire Tool	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Q1	Level of knowledge of MBC before learning DOAP	0 (0%)	12 (30%)	23 (57.5%)	5 (12.5%)	0 (0%)
Q2	Level of skill (MBC) before learning DOAP	5 (12.5%)	27 (67.5%)	5 (12.5%)	3 (7.5%)	0 (0%)
Q3	The traditional method of MBC is better than the DOAP method	0 (0%)	2 (5%)	7 (17.5%)	29 (72.5%)	2 (5%)
Q4	DOAP method of MBC is better than the traditional method	26 (65%)	5 (12.5%)	7 (17.5%)	2 (5%)	0 (0%)
Q5	DOAP method is more learner-friendly due to feedback	21 (52.5%)	16 (40%)	3 (7.5%)	0 (0%)	0 (0%)
Q6	Supervised step-by-step teaching makes the DOAP method more learner-	29 (72.5%)	11 (27.5%)	0 (0%)	0 (0%)	0 (0%)
Q7	DOAP is better than the traditional method of basic procedural skills	28 (70%)	5 (12.5%)	7 (17.5%)	0 (0%)	0 (0%)
Q8	Motivated to learn other procedural skills after learning MBC by the DOAP	28 (70%)	6 (15%)	3 (7.5%)	3 (7.5%)	0 (0%)
Q9	A better method for learning skills in intern doctors	Traditional 0 (0%)			DOAP 40(100%)	

All participants (100%) knew all the critical steps of MBC after the DOAP training compared to 52.5% before ( $p=0.000$ ). The ability to perform MBC with all critical steps increased from 20% to 82.5% ( $p=0.000$ ). Knowledge of the 'No Touch technique' and the difference between traditional and DOAP method principles also showed significant improvement ( $p=0.000$  for both). This supports the notion that structured, repetitive practice combined with immediate feedback significantly enhances skill acquisition [17,18].

The evaluation comparing the traditional and DOAP teaching methods among participants revealed compelling results. The DOAP method showed exceptional effectiveness in various key areas related to bladder catheterization. Participants demonstrated significantly improved understanding and execution of critical steps ( $P=0.000$ ), indicating a comprehensive grasp of the procedure. Moreover, under DOAP, there was a remarkable increase in participants' ability to perform MBC with all critical steps ( $P=0.000$ ), indicating enhanced practical skill development. Additionally, significant advancements were observed in counselling skills before and after the procedure ( $P=0.000$ ), showcasing a more holistic approach to patient care. The participants also showed a profound understanding of the differences between traditional and DOAP teaching principles ( $P=0.000$ ), emphasizing the depth of comprehension achieved with the DOAP method. Overall, the DOAP method exhibited substantial superiority over traditional teaching in improving critical knowledge, practical skills, patient interaction and understanding of teaching methodologies in the context of bladder catheterization training (Table 3).

### Comparative Effectiveness

The results consistently demonstrate the superior effectiveness of the DOAP method over traditional methods. The structured, hands-on approach of the DOAP method not only improved the participants' knowledge and skills but also increased their confidence and motivation to learn. The DOAP method's emphasis on observation, assistance and supervised performance ensures that learners receive comprehensive feedback and guidance, which is crucial for mastering psychomotor skills. These findings are corroborated by other research that underscores the benefits of structured and feedback-rich learning environments in medical training [19,20].

**Table 3: Participant evaluation by faculty -DOPS method.**

#### Traditional Method DOAP

Sr. No.	Evaluation Parameter of Participant	Traditional Method			DOAP Method		P value
			Freq	%	Freq	%	
P1	Possess MBC Knowledge	Yes	39	97.5	40	100	1
		No	1	2.5	0	0	
P2	Knows all the critical steps of MBC	Yes	21	52.5	40	100	0.000
		No	19	47.5	0	0	
P3	Knows indications of the MBC	Yes	32	80	40	100	0.005*
		No	8	20	0	0	
P4	Able to perform MBC with all critical steps	Yes	8	20	33	82.5	0.000
		No	32	80	7	17.5	
P5	Knows 'no touch technique'	Yes	14	35	40	100	0.000
		No	26	65	0	0	
P6	Able to arrange items required for MBC correctly	Yes	33	82.5	38	95	0.154
		No	7	17.5	2	5	
P7	Has counselling skills before and after the MBC procedure	Yes	21	52.5	37	92.5	0.000*
		No	19	47.5	3	7.5	
P8	Has counselling skills before and after the MBC procedure	A	16	40	2	5	0.000*
		B	12	30	5	12.5	
		C	8	20	27	67.5	
		D	4	10	6	15	
P9	Knows aftercare of MBC	Yes	33	82.5	38	95	0.154
		No	7	17.5	2	5	
P10	Knows the difference between traditional & DOAP method principles	Yes	13	32.5	38	95	0.000
		No	27	67.5	2	5	

**MBC:** Male Bladder Catheterization, **DOPS:** Direct Observation of Procedural Skills

\*: Significant, : Highly Significant

#### Real-life Implications

The study's findings align with existing literature that emphasizes the importance of interactive and practice-oriented training methods in medical education. Effective psychomotor skill development is critical for patient safety and the professional growth of medical interns. The DOAP method's success skills and integrating advanced technologies like virtual and augmented reality could further enhance training programs. Continuous feedback and follow-up assessments are crucial for ensuring sustained improvement in clinical competence.

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In this study suggests that incorporating such structured training programs into medical curricula could significantly enhance the

quality of healthcare provided by new doctors. Studies have shown that such methods lead to better retention of skills and improved performance in clinical settings [21,22].

#### Conclusion

This study confirms that the DOAP method is more effective than traditional teaching methods in developing the psychomotor skills of intern doctors. The DOAP method's structured, hands-on approach leads to significant improvements in knowledge, procedural skills, communication skills and confidence suggesting impact on all three domains(knowledge, skill and affective) of learning. These findings advocate for the integration of the DOAP method into medical training programs to enhance the overall competence and preparedness of future medical professionals.

### Future Recommendations

Future research should validate these findings through larger-scale studies and explore the long-term effects of the DOAP method on skill retention. Investigating the DOAP method's application to other procedural.

### Conflict of Interest

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

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