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Direct observation of procedural skills evaluation of suturing skills in surgical interns: A comprehensive analysis

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ABSTRACT

Background: The internship period in medical education serves as a critical phase for students transitioning from theoretical learning to practical application within clinical settings. Surgical specialties, in particular, demand a high level of skill and competence from interns due to the inherent risks associated with surgical procedures. However, there is often a gap between the theoretical knowledge gained in medical college and the practical skills required in surgical practice. **Aims and Objectives:** Therefore, keeping all the above facts in mind, the present study was undertaken to implement direct observation of procedural skills (DOPS) as a method for evaluating the suturing skills performance in interns. **Materials and Methods:** This study focused on an intern in the Department of Surgery, aiming to assess their suturing skills using the DOPS method. A structured workshop was conducted to provide interns with hands-on training in suturing techniques. Subsequently, interns were divided into groups and assessed by assigned assessors using the checklist. Feedback was provided to interns after each assessment session. Data were collected through self-administered questionnaires distributed to interns and assessors, and statistical analysis was performed using SPSS software. **Results:** Analysis of the data revealed a significant improvement in suturing skill scores among interns following the implementation of DOPS assessments. Mean scores increased substantially from the initial to subsequent attempts, indicating enhanced proficiency in suturing skills. Interns expressed positive perceptions of the DOPS methodology, highlighting its effectiveness in driving learning and improving confidence in performing surgical procedures. **Conclusion:** DOPS not only facilitates skill development but also promotes confidence and competence in interns, preparing them for clinical practice. Overall, DOPS emerges as a valuable approach for evaluating and improving suturing skills among interns, contributing to their professional development as competent health-care practitioners.

Key words: Medical internship; Surgical skills; Suturing; Direct observation of procedural skills; Workplace-based assessment; Clinical competence

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INTRODUCTION

In medical college settings, the term "intern doctor" typically denotes a "pre-physician." Broadly speaking, it encompasses students embarking on a year-long service within a hospital, aimed at acquiring foundational knowledge and skills before concluding their medical studies. This internship period plays a pivotal role in the progression from medical college to assuming the role of general practitioner or specialist. It predominantly entails hands-on training under the supervision of seasoned colleagues, who provide guidance, feedback, instruction, and assessment to the interns.[1,2]

The academic achievement of medical students plays a pivotal role in ensuring the effectiveness of the

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educational journey. The assessment of medical students is a multifaceted process marked by ongoing adjustments to evaluation methods by medical institutions. Assessing clinical skills holds particular significance and complexity as it directly influences patient care delivery. Workplace-based evaluation methods frequently utilize tools such as direct observation of procedural skills (DOPS), mini-clinical evaluation exercises, and case-based discussions to gauge students' competencies.[3-5]

DOPS is a workplace-based assessment (WPBA) tool wherein the examiner directly observes the student performing a routine procedure on an actual patient in a real clinical setting and provides immediate feedback.[6,7] DOPS was officially introduced by the Royal College of Physicians in the UK in 2005, and it was initially piloted by the United Kingdom Foundation Programme.[8] DOPS is situated at the highest levels of Miller's Pyramid of clinical competence, specifically under "Shows How" and "Does," where the most significant learning occurs.[9]

WPBAs involve the evaluation of interns' performance within their actual work setting. Unlike numerous other assessments in medical education, these evaluations take place within the interns' regular job responsibilities, rather than in artificial environments.[10]

DOPS aims to assess the execution of specific skills within the workplace rather than evaluating the individual. Its objective is to ensure that the skill is performed accurately, adhering to established criteria and utilizing a predetermined checklist. Within the DOPS framework, interns are evaluated based on their demonstrated understanding of indications, relevant anatomy, procedural technique, obtaining informed consent, displaying appropriate pre-procedure preparation, technical proficiency, adherence to aseptic technique, seeking assistance when necessary, post-procedure management, communication skills, consideration of patient welfare and professionalism, and overall proficiency in performing the procedure with real patient encounters.[11,12] Although popular among motivated students for the challenging opportunities the subject presents, safety remains the cornerstone of surgical training and practice. Postgraduate residents require standardized training to attain clinical competence essential for their practice.[13] Therefore, keeping all the above facts in mind, the present study was undertaken to implement DOPS as a method for evaluating the suturing skills performance of interns.

Aims and objectives

To evaluate Direct observation of procedural skills (DOPS) of suturing skills in surgical interns.

MATERIALS AND METHODS

The research centered on fourth-year medical students, commonly referred to as medical interns, who were placed in the Department of General Surgery for their fourth rotation during the academic year 2023. During their internship, 60 interns assigned to the surgery department and consenting to participate attended a basic workshop on suturing skills conducted within the department. They received hands-on training in suturing techniques using suturing pads. Subsequently, they were divided into groups of three, each comprising 20 interns, to be assessed by an assigned assessor. Under the assessor's observation, each intern performed the required suturing skill 3 times. In total, interns performed 180 suturing skills, each of which was assessed by the assessor using the DOPS checklist, with feedback provided to the intern after each skill session. On completion of the study, feedback was obtained from both the interns and assessors.

The checklist utilized included the following criteria:

1. Understanding of relevant anatomy
2. Identification of indications for suturing
3. Acquisition of informed consent
4. Preparation before the procedure
5. Implementation of aseptic technique
6. Administration of analgesia (if applicable)
7. Proficiency in the technique of the procedure
8. Willingness to seek assistance when necessary
9. Management of post-procedural care
10. Demonstration of effective communication skills
11. Overall performance assessment
12. Time taken to complete the procedure.

A standardized assessment checklist for use by assessors was prepared and verified through collaboration between consultants in the department of surgery and experts in medical education. The assessors comprised GPs and consultants in surgery who were trained in DOPS and the use of the developed assessment tool.

All interns underwent training on standardized procedures. The introduction and assessment occurred during the interns' regular duties. Each student was observed by the assessor using DOPS tailored for each procedure. The assessment utilized above mentioned checklist. Following the test, interns received specific verbal and written feedback based on the checklist, allowing them to identify strengths, weaknesses, and areas for improvement. If the score falls in 1–3, then it is below expectations, 4–5 borderline expectations, 6–8 meets expectations, and 9–10 above expectations. They were required to repeat the process 3 times. The outcomes were recorded in their portfolios to demonstrate skill in surgical procedures. A 5-point Likert

scale was employed to measure the satisfaction levels of both interns and assessors: strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree. Hence, a total of 63 feedbacks were taken into consideration for perception of participants about DOPS.

The data collection tools employed consisted of self-administered, semi-structured questionnaires designed for interns. Following the implementation of the DOPS interventions, these questionnaires were distributed to students. The questionnaire comprised various statements addressing the application, perceptions, experiences, levels of satisfaction, perceived limitations of utilizing DOPS as a teaching–learning tool, and the feasibility of integrating it into regular work routines. Before participation, participants provided comprehensive informed consent, and the study procedures were thoroughly elucidated to them, offering a complete justification.

Statistical analysis

Statistical data analysis was conducted using IBM SPSS version 25.0 software. The collected data were organized in an Excel spreadsheet and utilized to generate a master chart. Tables and graphs were then constructed based on the master chart. For quantitative data analysis, mean and standard deviations, whereas for qualitative data, number and percentage were calculated. Repeated measures of ANOVA were performed to assess the effectiveness of the DOPS method followed by the *post hoc* Bonferroni method to determine statistical significance. A significance level of $P<0.05$ was considered statistically significant.

RESULTS

The table revealed a noteworthy enhancement in suturing skill proficiency assessed through the DOPS method. The mean score for suturing skills significantly increased from 3.97 on the initial attempt to 7.07 on the subsequent attempt, with the mean score significantly rising from 7.07 on the second attempt to 9.15 on the subsequent attempt ($P<0.001$). This remarkable improvement underscores the effectiveness of the DOPS methodology in skill development. Furthermore, the mean percentage increase in the suturing skill score amounted to an impressive 43.84% from 1st to 2nd attempt, whereas the mean percentage increase in the suturing skill score reached an impressive 22.73% from 2nd to 3rd attempt. These findings underscore the utility and efficacy of the DOPS approach in enhancing surgical skill acquisition, thus warranting consideration for broader implementation in medical training curricula (Table 1 and Figure 1).

Comparing the 1st and 2nd attempts, a mean difference of −3.100 ($P<0.0001$) suggests a significant increase in suturing skill scores from the 1st to the 2nd attempt, with a 95% CI ranging from −3.360 to −2.840.

Similarly, comparing the 2nd and 3rd attempts, a mean difference of −2.083 ($P<0.0001$) indicates a significant increase in skill scores from the 2nd to the 3rd attempt, with a 95% CI ranging from −2.360 to −1.807 (Table 2).

Overall, this table provides valuable insights into the progression or regression of suturing skills across different attempts, aiding in the evaluation of skill development over time.

Table 3 presents the participants' perspectives on DOPS. It offers insights into their agreement levels regarding key aspects of DOPS, including its effectiveness in driving learning, its superiority over traditional assessment methods, its potential to enhance self-confidence and communication skills among medical interns, and the feasibility of its routine use as an assessment tool. Furthermore, it provides data on participants' experiences of anxiety and nervousness during DOPS sessions. In response to whether participants felt anxious and nervous during DOPS, 45 participants responded "Yes" whereas 18 responded "No."

Table 1: Comparison of suturing skills in the interns by DOPS methods from 1st attempt to 3rd attempt

Attempts	Mean	SD	F-value	P-value
1st attempt	3.97	0.92	1156.25	<0.0001
2nd attempt	7.07	0.98		
3rd attempt	9.15	0.51		

DOPS: Direct observation of procedural skills

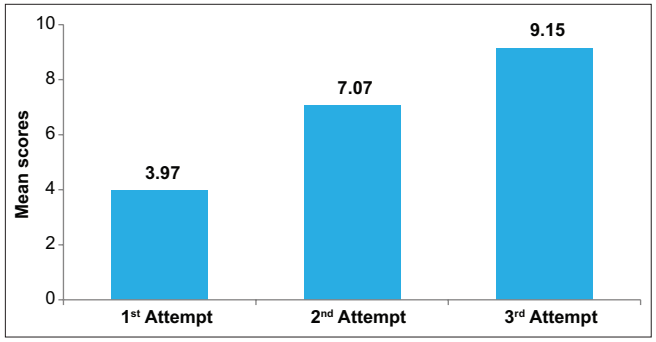

Figure 1: Suturing skill score by direct observation of procedural skills method

DISCUSSION

In the modern medical landscape, there persists a continual concern regarding the competency of medical students and their lack of readiness in surgical specialties. Many students

Table 2: *Post hoc* Bonferroni pairwise comparison of suturing skill in the interns by DOPS methods from 1st attempt to 3rd attempt

Comparison			Mean difference	Std. Error	P-value	95% CI[a]
1st	-	2nd	−3.100	0.105	<0.0001	−3.360–−2.840
	-	3rd	−5.183	0.108	<0.0001	−5.448–−4.918
2nd	-	1st	3.100	0.105	<0.0001	2.840–3.360
	-	3rd	−2.083	0.112	<0.0001	−2.360–−1.807
3rd	-	1st	5.183	0.108	<0.0001	4.918–5.448
	-	2nd	2.083	0.112	<0.0001	1.807–2.360

DOPS: Direct observation of procedural skills, [a]Bonferroni corrected

Table 3: Perceptions of participants about DOPS.

Perceptions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Do you agree assessment drives learning?	40	23	0	0	0
Do you agree DOPS is a better assessment tool in comparison to the traditional method	52	11	0	0	0
Do you agree DOPS will bring improvement in the self-confidence and communication skills of medical interns	30	29	4	0	0
Do you think there should be routine use of DOPS as an assessment tool	32	28	3	0	0
Were you anxious and nervous during DOPS	Yes	No			
	45	18			

DOPS: Direct observation of procedural skills

complete their internship without acquiring fundamental knowledge of surgical skills, leaving them feeling ill-prepared for clinical practice. This significant challenge in mastering surgical techniques and skills contributes to their sense of unpreparedness.[14] Suturing stands as a fundamental skill that anticipates graduating doctors to possess. However, it remains one of the most difficult skills to learn and master proficiently.

The DOPS abilities assessment is a workplace-based evaluation designed specifically for assessing clinical competencies and delivering feedback. By leveraging direct observation of interns performing procedures in authentic clinical settings, this approach proves highly effective in evaluating interns' practical skills and providing constructive feedback to improve their performance.[15,16]

In medical training, encompassing diverse facets including knowledge, procedural skills, communication proficiency, and clinical decision-making, the adoption of appropriate assessment methodologies is imperative to ensure the cultivation of competent and adept physicians.[17] Following the implementation of the DOPS abilities exercise within the Department of Surgery, a noticeable growth in interns' clinical aptitude was observed. This improvement stemmed from the integration and repetition of DOPS sessions focusing on routine surgical procedures.

In the present study, the mean score for suturing skills significantly increased from 3.97 on the initial attempt to 7.07 on the subsequent attempt (P<0.001). Furthermore, the mean percentage increase in suturing skill score amounted to an impressive 43.84%. Similar improved reported the success rate for suturing and knot tying was 94.50% by Hasen et al.[18]

The DOPS received favorable feedback from interns in our study. Consistent with prior research findings, DOPS was perceived as user-friendly and straightforward. Medical interns expressed a strong appreciation for the feedback opportunity offered by DOPS. Furthermore, participants in this study encountered notable challenges in implementing the assessment approach, including a lack of awareness and heavy workloads. This discovery is consistent with previous research indicating similar feedback mechanisms. Like prior studies, our research also revealed favorable perceptions of DOPS satisfaction and practicality.[19,20]

In our study, all interns unanimously regarded DOPS as a valuable method for driving learning and as a practical assessment tool, surpassing traditional methods such as MCQs, short cases, and long cases. In addition, 94% of interns expressed that DOPS positively impacted their confidence levels and contributed to an overall improvement in their practical skill performance. Furthermore, 95% of interns deemed DOPS feasible for routine use as an assessment tool.

The research conducted by Tenzin et al., demonstrated that DOPS can serve as an effective assessment method, with 87.6% of students acknowledging its utility.[21] Similarly, Morris et al., found that 70% of participants in their study

regarded DOPS as highly beneficial for enhancing clinical skills.[22] In addition, Profanter and Perathoner's research highlighted their benchmark study of a prospective randomized trial involving small groups of undergraduates and concluded that DOPS is a more efficient tool for teaching clinical skills compared to OSCE.[10]

Limitations of the study

The assessment was confined to a single center, potentially constraining the generalizability of the findings. Moreover, the small sample size may have compromised the statistical power of the study. Finally, the investigation was limited to a single department, potentially limiting the transferability of the results to other departments or settings. Therefore, further research with a larger participant pool is warranted.

CONCLUSION

The utilization of the DOPS methodology has demonstrated a significant enhancement in the competency and proficiency of interns. It not only fosters increased precision and confidence in performing suturing skills but also contributes to the development of effective communication skills among budding doctors. Over time, interns become more skillful at navigating the complexities of the operating theater environment. DOPS emerges as a highly effective WPBA method in enhancing the suturing skills of interns.

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SP- Definition of intellectual content, literature survey, prepared the first draft of the manuscript, implementation of the study protocol, data collection, data analysis, and submission of the article; **AA-** Concept, design, manuscript preparation, editing, and manuscript revision; **JP-** Design of study, statistical analysis, and interpretation; **PMP-** Review manuscript, literature search, coordination, and manuscript revision.

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