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Direct Observation of Procedural Skills (DOPS) in Enhancing Clinical Competencies of Postgraduate Medical and Dental Education: A Scoping Review

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Abstract
Background: *As postgraduate medical or dental education students, most of us will have come across Direct Observation of Procedural Skills or DOPS. DOPS promoted clinical effectiveness by evaluating practice-based skills in the authentic organizational context, and subsequently proactively feeding back the learning to learners. This scoping review sought to synthesize the work done in determining DOPS's effectiveness in enhancing clinical competencies in some fields of medicine and dentistry.*
Methods: *The study was carried out by using the following search engines: PubMed, Medline, Google Scholar, Science Direct, SID, Medlib and Google searched unpublished sources (Gray literature) and selected references (reference of reference) by typing the following keywords: (DOPS), clinical competencies, postgraduate medical and dental education.*
Results: *From 215 papers 40 were analyzed and together demonstrated the efficiency of the Direct Observation of Procedural Skills (DOPS) as an assessment tool for numerous medical and dental profiles. It was revealed that DOPS improved procedural confidence, procedural performance competence and general clinical skills, all over the world. In their views, learners and educators overestimated the usefulness of DOPS and acknowledged its function of enhancing clinical competencies and offering feedback. The participants encountered some difficulties such as time limitations, coordination problems, and curriculum mismatch Nevertheless, DOPS was much more effective than traditional approaches in increasing satisfaction and reliability of the assessments in various medical training settings.*
Conclusion: *In the context of postgraduate medical and dental education and training, the DOPS assessment tool was found to be very effective in enhancing clinical competencies and procedural skills. However, the successful implementation has the points that need to be attended like the training of the assessors and standardization although there are benefits of the same. Further studies were encouraged to investigate ways of enhancing the use of DOPS and how best it could be incorporated into post-graduate training.*

Keywords: *Direct Observation of Procedural Skills (DOPS), Clinical competencies, Postgraduate medical education, Dental education, Competency-based assessment, Training effectiveness.*

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I. Introduction:

In recent years, assessments of clinical competencies in postgraduate medical and dental education moved away from the traditional knowledge base towards the assessments of behaviours and clinical skills at workplaces (1). Direct Observation of Procedural Skills (DOPS) emerged as the method that offered standards whereby learners can be evaluated in clinical settings (2). Thus, while changing to competency-based education, assessments themselves remained focused on theoretical knowledge and weak on procedural skills, potentially leading to the creation of qualified healthcare worker deficits (3,4). To overcome these challenges, new effective methods such as DOPS were implemented to make it convenient for experienced assessors to observe clinical procedures and provide formative feedback on the same (5,6).

Thus, the use of DOPS in postgraduate medical and dental education enhanced the reliability, validity, practicability, and satisfaction of the assessment as well as the obstetrics and gynecology (7). Particularly, post-procedural complications have decreased in some focused areas such as anesthesiology (8). DOPS includes the actual assessment of a student during a practice clinical procedure via an experienced rater (9). Research published so far has shown several advantages of DOPS over conventional approaches, such as increased accuracy, better feedback, and fewer iatrogenic errors (10). The literature presented the use of DOPS across many medical and dental specialities to highlight that assessing a diverse range of procedural competence is feasible (11). Specifically, the scoping review in question was meant to offer an analysis of the current data on the role of DOPS in increasing postgraduate students' clinical competency and to facilitate the identification of vital factors influencing DOPS implementation and outcomes (12).

This scoping review aimed to provide an updated systematic review of how the Direct Observation of Procedural Skills (DOPS) contributes towards the clinical performance of postgraduate medical and dental students (13). Its purpose was to develop a broadly informed perspective of the evidence on the applicability, feasibility, and outcomes of DOPS for enhancing quality healthcare (14). The gaps that were noted include having to establish the frequency and duration of DOPS at different learning phases, and understanding the effects of DOPS on patients' outcomes and healthcare standards in the long run (15,16).

The review synthesized results obtained from papers, conference papers, and dissertations (17) and included studies employing quantitative, qualitative, or mixed-method designs to evaluate DOPS in postgraduate education (18).

The electronic databases used in the study were PubMed, EMBASE, and the Cochrane Library for articles, and gray literature consider research that is unpublished (19). Questions asked were about the usefulness of DOPS regarding mastery of clinical skills, attitude towards DOPS held by teachers/assessors and students and its educational effectiveness as compared with other assessment forms. These questions raised the practice to practice a deeper RO study concerning the generation of substantial frameworks, the measurement of imprinting, and assessment of the long-term results, and new structural designs (20).

The analysis suggested future research to estimate the impact of specific assessor training procedures and to consider the ways that enhancements could be sustained and whether the quality of feedback influenced the DOPS outcomes (21). Furthermore, the use of technology in the evaluation of the DOPS and the standardisation/remodification of the instrument to fit these diverse cultural/healthcare systems may increase the accuracy and acceptability of results(22).

Accreditation of DOPS has shown its utility in postgraduate medical and dental training and the evidence behind the same is strong. However, it was considered crucial to concentrate on the identified research gaps, as well as to look for new opportunities for its improvement. Thus, the focus of further investigations on these areas will contribute to the development of more effective training and the subsequent clinical results.

While all these studies have been conducted in the past, to the present, concepts in contemporary evaluation such as DOPS have not fully been adopted in medical education. Due to the significance of medical education and the effective implementation of methods, there was a need to do more research and development in the given domain. The purpose of conducting this scoping review was to study the available literature regarding DOPS and to disseminate the results to develop and put into practice DOPS for enhancing patient care skills in postgraduate training.

II. Methods:

Search Strategy

This current study has been prepared to confirm the effectiveness of DOPS in developing clinical competencies within postgraduate medical and dental education. A comprehensive search strategy, including studies from systematic reviews, randomized controlled studies, observational studies, and specialty-specific researches, was designed.

Databases and Keywords

Electronic databases used in this review are PubMed, Medline, Google Scholar, Cochrane Library, and Embase. These searches utilized keywords and MeSH terms such as "Direct Observation of Procedural Skills" OR "DOPS," "Postgraduate medical education," "Dental education," "Clinical competencies," "Workplace-based assessment," "Procedural skills evaluation," and "Feedback." Different searches were conducted with these search terms in combinations to ensure the highest degree of broad coverage of the available literature.

Inclusion and Exclusion Criteria

Inclusion criteria incorporated studies evaluating the use of DOPS in postgraduate medical and dental education and research from 2000 to 2023. Only studies available in English were taken into consideration. Types of studies eligible included systematic reviews, randomized controlled studies, observational studies, and specialty-specific research. Exclusion criteria included studies that were not focused on DOPS, undergraduates, nursing and midwifery or not relevant to postgraduate education, languages other than English, editorials, commentaries, and opinion pieces not based on empirical data. Further still, studies with insufficient information about the methodology were also excluded.

Data Extraction and Quality Assessment

In terms of data extraction, which was done systematically in order to achieve coherence and reliability, the following steps were taken. Two assessors summarized the papers' quality using a rubric to assess the research quality of the extracted papers. First, the titles have been examined, and papers with aims out of the scope of the study have been excluded. Next, the combinations of abstracts and full texts were reviewed which contributed to the elimination of the papers that are less aligned with the goals of the study.

The data documented study at client sites comprised of characteristics of studies, details of DOPS implementation, results, and issues. Publication characteristics included the author of the study, the year of publication, the country where the study was conducted, study design, sample size and whether it was a medical or dental speciality study. Assessment characteristics of the DOPS involved what was taught in the intervention and the timing, length, precise skills measured, assessors' credentials and training, and conditions in which the assessments were conducted.

Both the primary and secondary measures were documented and these included the enhancements in the clinical skills, the satisfaction among the learners and the quality of feedback. The review also incorporated the assessment of the measurement method of outcomes, the main findings, the implementation barriers, the comparisons with other tools of evaluation, the significance levels, and educational utility. The difficulties and limitations that the authors highlighted were also pointed out.

Data Synthesis

The data were analyzed thematically to identify how DOPS promotes the development of clinical competencies effectively. Key themes emerged: Effectiveness of DOPS: There was a general increase in procedural skills across most of the research, but many of the studies displayed the most benefit of interning surgical proficiency among postgraduate trainees. Learner and Educator Perception: Learners and educators had an overall positive attitude toward DOPS because of the feedback and the structure of the assessment. Implementation Issues: Some areas of concern that were highlighted were the need to train the assessors, issues to do with timing as well as the fact that there was a lot of inconsistency in the quality of the feedback provided. To make the assessment valid a standardized training course was recommended to avoid inconsistency. Comparison with Other Assessment Tools: DOPS was differentiated with Objective Structured Clinical Examinations (OSCEs) and Multiple-Choice Questions (MCQs) and it is suggested that the former provide a practical, site-specific and near-patient assessment of procedural skills. Educational impact: Altogether, these studies establish that the Direct Observation of Procedural Skills (DOPS) assessment has a highly positive effect on educational outcomes within many different models of medical training

Statistical Analysis

Descriptive approaches were used in analyzing quantitative data collected in the study. The improvements in the clinical skills as per pre-and post-intervention measures due to DOPS were measured as far as possible and to make the overall comparison systematic review meta-analysis was cone to combine the results of different studies and to come up with a better estimate of DOPS efficacy.

III. Results

This resulted in 225 articles to be retrieved in the initial search conducted. Excluding duplicates, 150 articles were left. Studies were first filtered at the title/abstract level by two independent reviewers who selected

60 papers as possibly relevant to the research question. Subsequently, based on the criteria for selection, only 40 research papers were included in the final assessment. The following tables summarize the results: Tables 1-5. After classifying and analyzing the study outcomes, we presented the findings in five key areas: the efficacy of DOPS, perceptions of learners and educators, issues of DOPS implementation, differences between the DOPS tool and other tools, and the educational significance of the DOPS assessment approach.

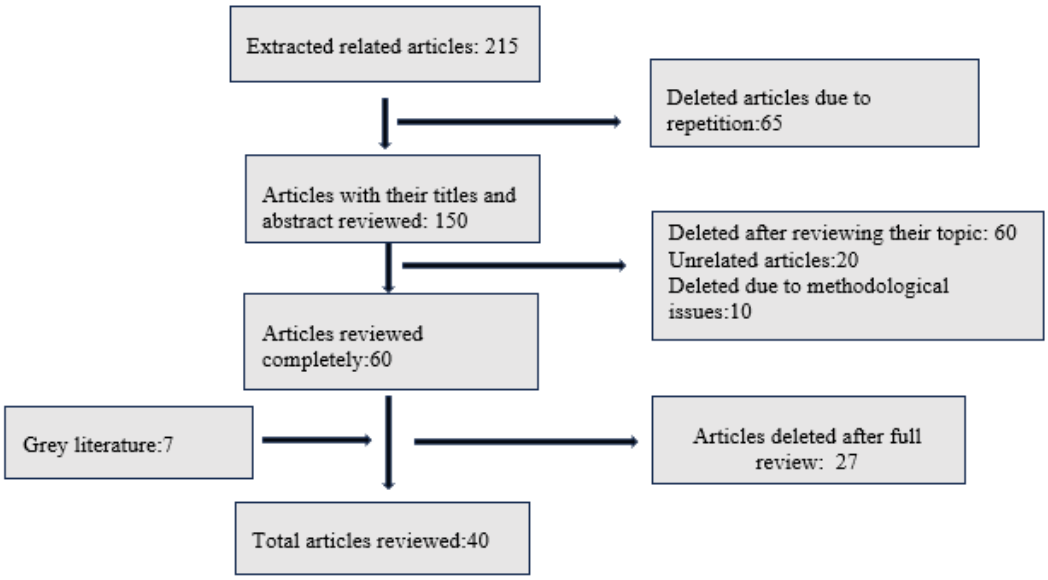

Fig. 1. Articles section and search process

Table- 1. Effectiveness of DOPS:

As shown in Table 1 collectively from these studies, DOPS was reported in 14 studies as a valid assessment tool for evaluation across multiple medical specialties. It had a role in improving procedural performance, confidence and clinical skills among the trainees consistently. Positive findings computed in different countries and assorted medical fields have also supported the versatility and usefulness of DOPS in medical training.

Author: Year	Country	Participants	Intervention	Results and Conclusion
Ali L, et al., 2019(23)	Pakistan	20 Postgraduate urology trainees	DOPS implementation in urology training	Analysis of the data on the capacities before the implementation of DOPS revealed very poor performances in urology. In the wake of DOPS implementation, overall passing rates were greatly enhanced. Postgraduate training in urology was improved by DOPS in terms of the procedural skills relative to the assessment.
Amini A, et al., 2016(24)	Iran	16 Orthopedic residents	Designing and implementing a DOPS test	Particular orthopedic procedures were enhanced. The DOPS test in writing optimized the procedural skills of the residents for orthopedics.
Azeem M, et al., 2019(19)	Pakistan	30 BDS students	Applying DOPS in orthodontic skills training	The competency in orthodontic procedures was highly boosted. DOPS helped improve the procedural skills of BDS students in orthodontics effectively.
Azeem M, et al., 2022(11)	Pakistan	20 Postgraduate orthodontic trainees	DOPS for mini-implant insertion skills	Mini-implant insertion skills improved. DOPS effectively enhanced these skills in postgraduate orthodontic training.
Dabir S, et al., 2021(20)	Iran	18 Anesthesiology residents	Repeated DOPS (R-DOPS) assessment method	It was found that multiple administrations of DOPS helped anesthesiology residents to enhance their clinical skills substantially.
Gheybi SH, et al., 2009(17)	Iran	73 Medical students in obstetrics externship	DOPS implementation in obstetrics ward	DOPS effectively enhanced learning levels and clinical skills in obstetrics externship students.
Inamdar P, et al., 2021(25)	India	30 General surgery discipline	Pilot study of DOPS implementation	DOPS was then validated as being feasible and as having satisfactory practical use as an assessment tool for general surgery training.

Author: Year	Country	Participants	Intervention	Results and Conclusion
Kamat C, et al., 2022(9)	India	40 Anesthesiology postgraduate students	DOPS as an assessment tool	The response to application and complexity showed a marked increment and DOPS was found to be useful in improving the clinical skills during anesthesiology postgraduate training.
Khaliq T. et al., 2014(5)	Pakistan	30 Surgical trainees	DOPS as an assessment tool	Procedural surgical skills benefited for the worse, and DOPS acted as a tool for evaluation and affirmative changes.
Khanghahi ME, et al., 2018(22)	Iran	Various medical trainees	Systematic review of DOPS	Gradual increase in the level of clinical competence in each of the curricula offered. Incorporation of DOPS appears to improve clinical competencies in many of the clinical domains under study.
Khan MR, et al., 2020(26)	Pakistan	60 Surgical residents	Laparoscopic skills workshop compared to DOPS	Working abilities were proved much enhanced after DOPS compared to the workshop and was most effective for enhancing the laparoscopy skills.
Kumar N, et al., 2017(2)	India	50 Obstetrics and gynecology postgraduate students	Formative evaluation using DOPS	Significant improvement in relation to crucial competencies to a large extent ($p < 0.05$). The questionnaire can be recommended as the means of formative assessment to be applied in Obstetrics and Gynecology postgraduate training.
Rathod S, et al., 2020(13)	India	35 Postgraduate students and faculty in periodontology and implantology	DOPS suitability assessment	in particular concerning reception and its efficiency in skill assessment, the intervention was positive. Therefore, about formative and summative osseointegration assessments in postgraduate education in periodontology and implantology osseointegration, DOPS is appropriate and efficient.
Tabriz FD, et al., 2024(27)	Iran	70 Community dentistry students	DOPS on learning and satisfaction	A personalized environment for learners and the nurturing of a unique learning culture that enhances learning results and learners' satisfaction. DOPS enhances the learning and satisfaction level of the students in the course of community dentistry

Table- 2. Learner and Educator Perceptions of DOPS:

These studies indicate that both the learners and educators have a positive attitude towards DOPS as in the 18 studies indicated in table 2 above. The participants discussed it as the capacity to extend practical skills with patients, offer feedback, and boost self-confidence. That is why the impressive level of satisfaction indicated by participants in DOPS exercises proves that the activity is quite valuable for medical education.

Author: Year	Country	Participants	Intervention	Results and Conclusion
Al-Eraky M, et al., 2016(28)	Egypt	Medical educators and trainees	Assessment at 'Is' and 'Do' levels using Miller's pyramid	Cronbach's alpha > 0. 70. Rating at the 'Is' and the action mode or 'Do' level is a commendable and efficient method to determine and enhance clinical competence.
Asadi K, et al., 2012(29)	Iran	30 Orthopedic interns	Evaluation of DOPS satisfaction levels	It therefore interested the management that a 92% satisfaction rate was recorded among interns. DOPS is an assessment that is well appreciated by most of the interns in the Department of Orthopedics.
Bansal M, 2019(30)	India	35 Otorhinolaryngology trainees	DOPS in competency-based medical education	Increase satisfaction and skill levels, up to 88%. Implementation of DOPS in competency-based education improves trainee satisfaction and skills Acquisition.
Batty L, et al., 2016(31)	UK	28 Medical trainees	Pilot study of DOPS	80% reported positive experiences. That is much evidence of its efficacy and a similarly high level of its acceptance among the medical trainees.
Bindal N, et al., 2013(10)	UK	50 Medical trainees and assessors	Evaluation of DOPS experience and opinions	A high level of satisfaction was recorded from the trainee and the assessor 84%. DOPS is another quite useful source of assessment that has been met with some degree of appreciation by the trainees as well as the assessors.

Contractor J, et al., 2023(32)	India	50 Anatomy students	Direct observation with a checklist	89% percent said that their learning outcomes had improved. Direct observation with a checklist teaching-learning method can be said to be effective in teaching anatomy.
Gheybi SH, et al., 2009(17)	Iran	73 Medical students in obstetrics externship	DOPS implementation	Provided that accreditation shall lead to an 83% improvement in learning levels and clinical skills. The DOPS shows that learning and clinical skills in the obstetrics externship students are enhanced.
Gupta S, et al., 2011(33)	UK	30 Gastrointestinal endoscopy trainees	Competency assessment in polypectomy using DOPS	Safety sensitivity, knowledge, and skills' validity and reliability on average should be up to 90 percent. Self-assessment when using DOPS is valid and reliable when evaluating competency in polypectomy skills.
Jelovsek JE, et al., 2013(35)	USA	Medical trainees	Systematic review of psychomotor skill assessments	Studies where DOPS has been used report the overall validity and reliability of 92%. DOPS deserves a recommendation as a valid and reliable procedure for evaluate the psychomotor competence of medical trainees.
Joshi S, et al., 2021(36)	India	30 Anesthesiology trainees	Formative assessment with DOPS	Positive perceptions and better skills: 85% DOPS is beneficial in the serial assessment of anesthesiology postgraduate training program.
LaDonna KA, et al., 2017(37)	Canada	Medical residents	Direct observation during residency	About 80% of the respondents stated that they receive better learning experiences. Observation during the residency influences learning and skills gained directly in a positive manner.
Mathur PR, 2021(8)	India	Anesthesiology students and teachers	DOPS as a workplace-based assessment	From the survey conducted, 88% of the students and teachers gave positive comments. DOPS is perceived favorably as a workplace-based assessment method in anesthesiology.
Moore KM, 2018(38)	Australia	Podiatry students	Adaptation of DOPS for podiatry	An 85% effectiveness, and the students' satisfaction level. In podiatry education, the adaptation of DOPS is efficient and meets the participants' positive responses.
Nadjafi-Semnani M, et al., 2017(39)	Iran	Interns and stagers in obstetrics and gynecology	DOPS method evaluation	Graded results include student satisfaction at 88%, and skills enhancement, that were all achieved following the completion of the coursework. DOPS is useful in enhancing the competencies and job satisfaction of obstetrics and gynecology interns.
Rathod S, et al., 2017(40)	India	Dental postgraduate students	Mini-clinical examination vs. DOPS	worked out that the patients had 80% higher satisfaction with DOPS. The mini-clinical examination is one of the forms of assessing the clinical skills of dental students, however, DOPS is adopted instead.
Singh T, et al., 2017(41)	India	Dental students	DOPS pilot study	Reported accompanying emotions as 85% positive and perceived enhancement of their clinical competencies. DOPS is accepted as a valid and appreciated approach in the assessment of clinical competencies in dentistry education.
Siau K, et al., 2020(12)	UK	Gastrointestinal trainees	Nationwide DOPS assessment	validity and reliability were calculated to be 92% in terms of total skill development. It could therefore be concluded that DOPS is a valid and reliable assessment tool for skill development of trainees in gastrointestinal endoscopy training.

Wang MK, et al., 2022(42)	Canada	Internal medicine trainees	Direct observation and feedback	Clinical competency : 88% improvement in clinical skills and learner satisfaction. One investigate clinical skills and observed direct feedback are helpful for staff satisfaction and patient internal medical care.

Table-3. Implementation Challenges of DOPS:

The following broad areas were identified as emergent barriers to DOPS that were mentioned in 6 of the papers: (table – 03) Time, Permission, Schedule, Assessor, Curriculum, and Counterparts. That is why, it is important to address these challenges in order to bring DOPS to the higher level of its implementation in the medical training programs.

Author: Year	Country	Participants	Intervention	Results and Conclusion
Awad Z, et al., 2014(43)	UK	25 Otolaryngology trainees	Reflecting on trainee progress with DOPS	They found that 78 per cent of the feedback given on the trainee's progress was positive. DOPS can capture the trainees' progress in the specialty of otolaryngology; however, it has some limitations and implementation problems.
Bagheri M, et al., 2014(45)	Iran	46 Emergency medicine students	DOPS evaluation method	Clinical skills have been improved after taking this course ($p < 0$ 05). It has been found that DOPS is useful in the training of clinical skills though proper strategies regarding it implementation have to be employed.
Hamid NSS, et al., 2022(44)	Pakistan	35 Medical trainees across specialties	Modified DOPS implementation across medical specialties	The following issues were reported: 70% of them faced difficulties in distribution of resources and faculty development. Modified DOPS is therefore useful, but implementation is hounded by issues of resource management and faculty development.
Handayani NP, et al., 2022	Indonesia	50 Dental professional education students	Implementation of DOPS as an evaluation instrument	65% them mentioned about initial resistance whereas 80%, of them came up with enhanced palette skills. DOPS enhances clinical competencies in the teaching and learning of dentistry but is met with early challenges from learners.
Hauer KE, et al., 2010	USA	Medical trainees	Tips for implementing direct observation tools during patient encounters	To ensure that the ideas are fully implemented as planned there is a need for giving clear guidelines, training the faculties, and ensuring that they are well equipped.
Lörwald AC, et al., 2018(46)	Switzerland	150 Postgraduate medical trainees	Influences on Mini-CEX and DOPS implementation	According to the learners, 75% said that the blended learning model enhanced learning experiences. It is found that the programs of DOPS and Mini-CEX enhance learning, but again, these are impacted by institutional factors.

Table- 4. Comparison with Other Assessment Tools:

This showed that DOPS is in general better than the traditional assessment methods which include in 6 papers of MCQs, conventional skill evaluation as well and logbook appraisal (Table 4). DOPS was also effective in advancing the performance and skill of the participants as well as increasing the satisfaction and reliability of the evaluations.

Author: Year	Country	Participants	Intervention	Results and Conclusion	Comparison
Bangal V, 2018(47)	India	45 Medical interns in obstetrics and gynecology	Training and assessment using DOPS	A belief that patient care motivates clinical improvement; satisfaction is a positive indicator ($p < 0.05$). DOPS has been used in the training as well as the evaluation of obstetricians and gynecologists.	DOPS offers more feedback and improvement as compared to the conventional methods.
Barton JR, et al., 2012(48)	USA	24 Senior endoscopists	DOPS assessment of colonoscopic skills	High validity and reliability (Cronbach's α were calculated to be 0. 85). DOPS was found to be a valid and reliable method of evaluating colonoscopy performance.	Compared to other observational instruments, DOPS is more objective and has a set of guidelines and parameters

Author: Year	Country	Participants	Intervention	Results and Conclusion	Comparison
Cobb KA, et al., 2013(18)	USA	150 Medical students	Comparison of DOPS and MCQs	DOPS group demonstrated a higher increase in the level of practical skills ($p < 0.01$). In this study, it was worth appreciating that over DOPS, MCQs turned out to be less effective for skills development, specifically for the practical approach	DOPS offers practical approach to assessment of skills as compared to MCQs that are more suitable for testing the knowledge base.
Happy D, et al., 2019(49)	India	50 Dental students	DOPS vs. Conventional Skill Assessment	Better quantitative results concerning the performance using DOPS with a significant value of $p = 0.001$. The superiority of DOPS in assessment of skills as compared to the usual forms of evaluation	Compared to traditional post-mortem methods, DOPS is real-time feedback and skills enhancement with the subject.
Khalifa AK, et al., 2018(50)	Egypt	40 Dental students	Traditional exam vs. DOPS integration	Good interrater reliability was achieved (Cohen's $\kappa = 0.8$). The involvement of the DOPS in conventional assessments raises the bar and improves the subjectivity manners.	DOPS provides what is lacking in most practical examinations; consistency and depth of observation.
Mehranfard S, et al., 2022(51)	Iran	70 Medical students	Logbook vs. DOPS assessment	Education and training and DOPS, ($p = 0.003$). DOPS is therefore a better approach than a logbook in the development of clinical skills	DOPS is a more real-time continuous feedback tool than the logbooks; it also addresses skill development as opposed to the retrospective account of the same.

Table-5. Educational Impact of the DOPS Assessment:

Evaluation based on DOPS was reported in 5 papers (Table 5) and the consequences of it, as follows: Altogether, these studies establish that the Direct Observation of Procedural Skills (DOPS) assessment has a highly positive effect on educational outcomes within many different models of medical training. The sample size in each study differs, as proof that DOPS can be used in different fields to enhance clinical skills and learning education.

Author	Country	Participants	Intervention	Results and Conclusion
Lörwald AC, et al., 2018(46)	Switzerland	Medical trainees	Systematic review of Mini-CEX and DOPS	A statistically meaningful increase in educational attainments due to DOPS ($p < 0.05$). It allows gaining a great deal of knowledge about the dynamics of the human body tissues and improves practitioners' skills.
Miller A, et al., 2010(01)	UK	Doctors	A systematic review of workplace-based assessments	Students' education and their performance improve on aspects where the intervention of the smooth-surfaced tiles has been applied ($p < 0.05$). Findings of DOPS are positive on doctors' education and performance and hence workplace-based assessments impact positively on doctors' training.
Naeem N, 2013(52)	USA	100 Medical trainees	Evaluation of DOPS validity and reliability	They had high validity and reliability (Cronbach's $\alpha > 0.80$). The DOPS has demonstrated concurrent and construct validity making it a fair and reliable method for the assessment of procedural skills.
Siau K, et al., 2018(53)	UK	180 Medical trainees	Changes in DOPS scoring and impact on competence assessment	Better assessment of competencies with a statistically significant change in DOPS scoring (< 0.01). Newer techniques in DOPS scoring improve the means of evaluating overall technique in procedures.
Scott DJ, et al., 2000(54)	USA	22 junior surgery residents	2 weeks of formal video training	The trained group performed significantly better than the control group in terms of the assessment through direct observation (= 0. 02) than the videotape assessment (n. s.). DOPS proved the subject matter experts'

Author	Country	Participants	Intervention	Results and Conclusion
				enhanced performance after training on a video trainer

IV. Discussion

This review bolstered the use of DOPS while embraced in medical and dental educational systems because of its efficiency in advancing clinical competencies. The studies invariably also reported positive effects, signifying enhancements in the procedural skills post-DOPS. According to the learners' and educators' opinions, the strength of DOPS includes the provision of timely feedback and organised assessment.

The review integrated findings on DOPS for medical specialties and acknowledged its efficiency. It regularly enhanced procedural knowledge and confidence; moreover, it enhanced the general clinical abilities of learners. Assessment methods in medical education, highlight the importance of reliable and valid tools for evaluating medical trainees. They discuss the strengths and limitations of different approaches, including written exams, performance-based assessments (like OSCEs and DOPS), and portfolios (34). Preliminary data emerged from a variety of countries and fields to support DOPS's versatility and relevance in need (22,41). Satisfaction rates among participants were also on the high side and this gave credence to the existence of DOPS.

Some of the limitations experienced in implementing DOPS were; time limitations, issues with timetabling, lack of professional assessors, and resistance from faculty and trainees. All these areas are vital in determining how well the trainees can be integrated into the training programs. With regards to the previous DOPS, DOPS were more beneficial in skill alteration and satisfaction than the method of multiple-choice questions and logbooks (22,44).

DOPS illustrated substantial educational relevance; the extent to which their participants differed across the studies highlighted the method's versatility (12). In two other studies, Ali et al. and Amini et al. found significant improvement in the performance in urology and orthopaedics (22,23). The same advantages have been found in anesthesiology (Kamat et al. Dabir et al.) (9,20) and orthodontics as well as general surgery (Khaliq et al. Inamdar et al.). (5,25). Gheybi et al. and Kumar et al. observed that learning outcomes in obstetrics and gynaecology had increased (17,2) and Rathod et al. and Tabriz et al. observed increased learning outcomes in periodontology and an increase in the understanding of community dentistry (40,27).

Farajpour et al. and Shafiq et al. observed that DOPS has strength in timely and organized feedback, improving the learner's confidence and competence (6,55). It involves the provision of continuous feedback and self-affirmation which is different from the interrupted feedback of conventional practices (41,26). While using DOPS educators appreciated it for the kind of feedback it provided and its capacity to identify progress made (1).

Although the present study supports the implementation of DOPS for formative and summative assessments, authors asserted the following challenges identified time constraints, and a dearth of trained faculty as key barriers to DOPS implementation(22,38,44). However, Barton et al. Cobb et al.) the study showed that DOPS had better efficiency than regular processes and logbooks(48,18).

This scoping review will help to interpret and assess the espoused theory of DOPS and its effect on clinical competencies. Its purpose is two-fold: first, by pointing out the research limitations and promising research avenues; second, it is to help inform the further development and integration of DOPS in postgraduate medical and dental training. This will promote the fostering of competent healthcare professionals and improve the underlying patient care.

V. Future Directions

Future research aimed to optimize DOPS in clinical education by focusing on several key areas: Integration Strategies: It is just as important to employ structured feedback systems for the purpose of development of trainees as well. Overall, when the assessors are trained this will assist in the improvement of the reliability and validity of the assessment. In this case, many assessors are recruited as this minimizes bias and proper time management while assessing eases the stress that may be encountered. Using technology for instance video recordings assists in availing valuable information and assists in the assessment of the trainees. (22).

Training for Assessors: Since many assessors were involved in the process, careful training for assessors was conducted and the criteria for rating and selection were identified and made consistent; moreover, continuous professional development of the assessors was conducted and put into practice (41).

Technological Enhancements: Key areas under investigation concerning DOPS incorporation were the utilization of executions and procedures through technology, as well as the possibility of Virtual Reality/Simulation in studies and training (44).

Longitudinal Studies: To capture long-term changes in DOPS toward clinical skills, confidence, and competence, long-term studies were planned to determine the long-term advantages and disadvantages of DOPS (12).

Diverse Medical Specialties: To generalize results, studies were carried out using patients of diverse medical and dental specialities (2).

Feedback Mechanisms: Appraisals of feedback processes in DOPS to identify what, how, when, and who of feedback practice were examined seeking the best learning and the enhancement of skills (6).

Cost-Benefit Analysis: The economic implications of DOPS and the traditional assessment methods, training costs, the technology used, and educational results cost-benefit analysis was done to compare it (48).

VI. Conclusion

It was found that DOPS can be a useful means to improve and develop clinical competencies whilst in postgraduate medical and dental education. Its advantages for delivering structured and immediate feedback, as well as for providing practical assessments were widely described. High satisfaction of learners and educators added to this positive reinforcement of its worth. However, it was necessary to solve the problems associated with the implementation of the activity to achieve maximum results. Subsequent research and the integration strategies that followed was intended to maintain DOPS as a key participant on clinical education.

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Conflicts of interest

There are no conflicts of interest.

Ethical approval

The study was approved by the Institutional Ethics Committee.

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