

## Effectiveness of DOPS “direct observation of procedural skills” as a method of formative assessment for improving the clinical skills of post-graduate students in the department of obstetrics and gynecology

Sanjivani Wanjari<sup>1\*</sup>, Alka Rawekar<sup>2</sup>

<sup>1,2</sup>Professor, Dept. of Obstetrics and Gynaecology, <sup>2</sup>Dept. of Physiology, Jawaharlal Nehru Medical College, Sawangi Wardha, Maharashtra, India

\*Corresponding Author: Sanjivani Wanjari

Email: [sanjivaniwanjari@yahoo.com](mailto:sanjivaniwanjari@yahoo.com)

### Abstract

**Introduction:** Traditional procedural training with heavier focus on factual knowledge and lower attentions to skill training can lead to graduates with poor procedural competence. DOPS –Direct observation of procedural skills is one of the means of assessing clinical performance by direct observation by the assessor. Performance using DOPS is structured and continuous.

**Materials and Methods:** Study design – Prospective interventional study was conducted in the department of obstetrics and gynaecology at JNMC Wardha. Sample size- 12 first year postgraduate students, were assessed with the help of 3 DOPS encounters and 2 procedures were observed for each student. The assessment of the post-graduate students was taken during the normal course of the student’s work.

**Results:** The scores of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> DOPS was compared to see if there is an improvement of the students. Two DOPS assessments were taken. First was on suturing techniques (skill 1) and second on urinary catheterization (skill 2). The mean DOPS scores in ‘skill 1’ group were 3.91 in first encounter A1, 6.50 in second encounter A2, and 7.25 in third encounter A3. In the ‘skill 2’ group the mean DOPS scores were 4.50 in first encounter B1, 6.75 in second encounter B2 and 7.33 in third encounter B3. There was a gross improvement in scores in the third encounter as compared to the first encounter.

**Conclusion:** Observing, assessing and providing feedback to students enhanced the quality of the skills. The DOPS assessments done repeatedly helped to improve the clinical skills of post graduate students.

**Keywords:** Medical education, Direct observation, Postgraduate, Training, Evaluation.

### Introduction

Work Based Assessment (WBA) is a form of authentic assessment testing performance in the real environment facing doctors in clinical practice. DOPS addresses the highest level of Miller’s pyramid i.e. level of “does” relating to performance.<sup>1</sup> Miller’s pyramid has been used over the last twenty years as a framework for assessing clinical competence. Several new methods of assessment have been developed and implemented over time that have focused on clinical skills (taking a history from a patient and performing a physical examination, communication skills, procedural skills, and professionalism).<sup>2</sup> Traditional procedural training with heavier focus on factual knowledge and lower attentions to skill training can lead to graduates with poor procedural competence.<sup>3</sup> DOPS –Direct observation of procedural skills is one of the means of assessing clinical performance by direct observation by the assessor. Assessment is structured and continuous, unlike the opportunistic observations previously used to form judgement on competence.

In the traditional pattern of education, the postgraduate students in the residency pattern are usually observed by peers, senior residents and junior faculty especially in emergency settings and occasionally by senior faculty mainly for elective procedures. Also, the feedback given is not structured. DOPS provides the opportunity of structured assessment and feedback.

By using repeated assessments, an assessor has the opportunity of collecting documentary evidence of the progression of individual trainees. It has been suggested that

observing, assessing and providing feedback to students will enhance the quality of the skills delivered.<sup>4</sup> This would have a positive impact on patients’ clinical care. This and increasing attention of the public and media on the performance of doctors have given rise to an interest in the development of robust methods of assessment of technical skills.<sup>5</sup>

### Rationale of the Study

In the current pattern of traditional education, the assessment of post-graduate students is mostly a summative assessment at the end of three years of residency, which includes theory papers and long and short cases and viva voce.

This mostly tests the theoretical knowledge, and the procedural or surgical skills as well as attitudes towards patients are not tested. This gap was identified in the traditional system of education and hence methods like DOPS may be necessary for a holistic evaluation of the post-graduate student.

### Aim

The aim of this study was to examine the effectiveness of DOPS “direct observation of procedural skills” in improving clinical skills in post-graduate students.

### Objectives

1. To introduce “direct observation of procedural skills” (DOPS) as a method of formative assessment.

2. To evaluate the improvement in clinical skills of post-graduate students after DOPS.
3. To collate perception regarding DOPS from faculty and post-graduate students.
  - a. Broad Objectives - to improve the quality of Doctors that pass out from the university. This will ensure quality care to patients and community at large.
  - b. Specific and measurable Objectives – to improve clinical skills of post-graduate students.

## Materials and Methods

1. Study design– Prospective interventional study
2. Study setting– Department of obstetrics and gynecology at a rural medical college and tertiary care referral centre.
3. Study duration – six months
4. Ethical issues– IEC clearance from institutional ethical committee was taken. Ref- letter no DMIMS (DU)/IEC/2018-19/7297.
5. Study participants- first year postgraduate students from department of obstetrics and gynecology.
6. Sample size- 12 first year postgraduate students or JR 1, were assessed with the help of 3 DOPS encounters and 2 procedures were observed for each student. This gives a sample size of 72 DOPS assessments.
7. Sampling– purposive sampling was done to include all first-year post-graduate students or JR 1 from department of obstetrics & gynecology. This is because I thought that if postgraduate students are trained at this initial level it will be more helpful. Also, this study can be later continued to include JR2and JR3.
8. Study plan- the post-graduate student was assessed for 2 procedures namely 1) suturing of episiotomy and 2) urinary female catheterization. There were 3 DOPS encounters for each procedure. The assessments were done at interval of one month each.
9. The standard format of DOPS which is already validated and available in the department was used.
10. Feedback was taken from the faculty and students regarding the effectiveness of DOPS as a tool for formative assessment. The feedback taken from faculty and students was in written format. This feedback questionnaire was included in the DOPS assessment form. [Attached as annexure- ANNEXURE 1] and no separate form was made.
11. Consent was taken from the Dean, Head of Department, faculty and participants. Clearance was sought from institutional ethics committee IEC. Letter of approval from IEC is attached. [ANNEXURE 2]

## Methodology

The faculty and post-graduate students were sensitized to DOPS. A power point presentation was made explaining the format of DOPS, the DOPS sheet was shown to them and explained to them. Then there was a discussion regarding the criteria, how the marking was to be made by the faculty and what was expected from the students. They were

explained that feedback was to be given by both the faculty and postgraduate students at the end of DOPS regarding their satisfaction regarding DOPS and its usefulness. At the same time, it was possible for the faculty to give immediate feedback to the students regarding what was done well and the areas that needed improvement.

The faculty and students were given time to ask questions and clear their doubts regarding implementation of DOPS. The interactive session went well.

A team of faculty members was formed who did the DOPS assessments, at interval of approximately one month.

The team included both senior and junior faculty - 2 professors and 2 assistant professors. The students and procedures that they assessed were selected by random allocation in order to reduce bias.

An assessor observed a student performing a procedure. The procedures were the same for all the students, namely 1) suturing of episiotomy and 2) urinary female catheterization and the difficulty level was the same for all the students.

DOPS assessment was done based upon Eleven Predetermined criteria. [Attached as [ANNEXURE 3]

The marking is done on a scale of 1 to 9

1. 1-3 is unsatisfactory
2. 4-6 satisfactory
3. 7-9 above expected
4. After that feedback is given by the assessor and trainee.
5. The feedback was given by the assessor for both their satisfaction regarding DOPS and for the trainee. This was written feedback given in a pre-structured feedback form.
6. Feedback was also given by the trainee regarding the usefulness and satisfaction regarding DOPS. The questions were open ended so that both the trainee and assessor could give their honest and unrestricted opinion.

The assessment of the post-graduate students was taken during the normal course of the student's work e.g. while conducting a delivery and suturing an episiotomy or while doing a urinary catheterization prior to a caesarean section or hysterectomy operations, as a part of his/her routine work as a junior resident in the unit/department. Each trainee was observed for over a period of 3 months as the DOPS assessments were done at interval of one month each. (i.e. their actual practice was observed and assessed)

The faculty was not allotted to any specific trainee. The PG students were randomly allotted to the faculty members. Since DOPS is a form of work place-based assessment, we ensured that work in the department and patient care did not suffer.

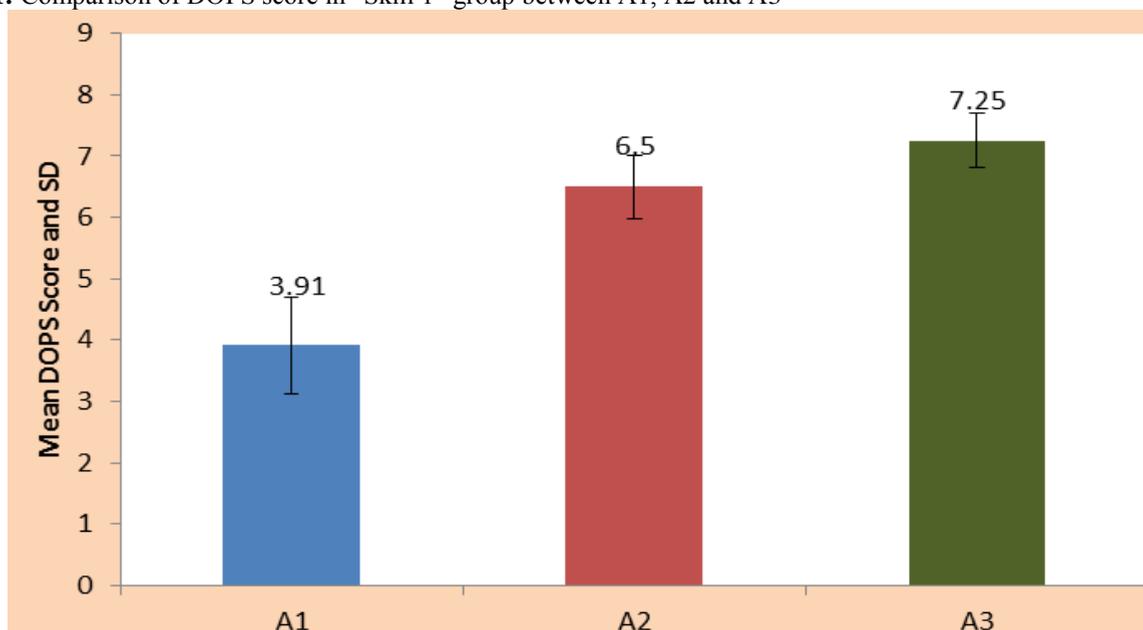
## Results

The scores of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> DOPS was compared to see if there is an improvement of the student's clinical skills, procedural skills and communication skills while doing the procedure.

Statistical analysis was done by using descriptive and inferential statistics using student's paired t test and software used in the analysis was SPSS 22.0 version and Graph Pad Prism 6.0 version and  $p < 0.05$  is considered as level of significance.

Two DOPS assessments were taken, first was on suturing techniques (skill 1) and second on urinary catheterization (skill 2). The mean DOPS scores in suturing group were 3.91 in first encounter A1, 6.50 in second encounter A2, and 7.25 in third encounter A3.

**Graph 1:** Comparison of DOPS score in "Skill 1" group between A1, A2 and A3



The Mean difference was  $2.58 \pm 0.90$  in first episode of DOPS, in second episode the Mean Difference was  $3.33 \pm 0.88$ , and in the third episode of suturing group was  $0.75 \pm 0.45$ .

**Table 1:** Comparison of DOPS score in "Skill 1" group between A1, A2 and A3 Descriptive Statistics

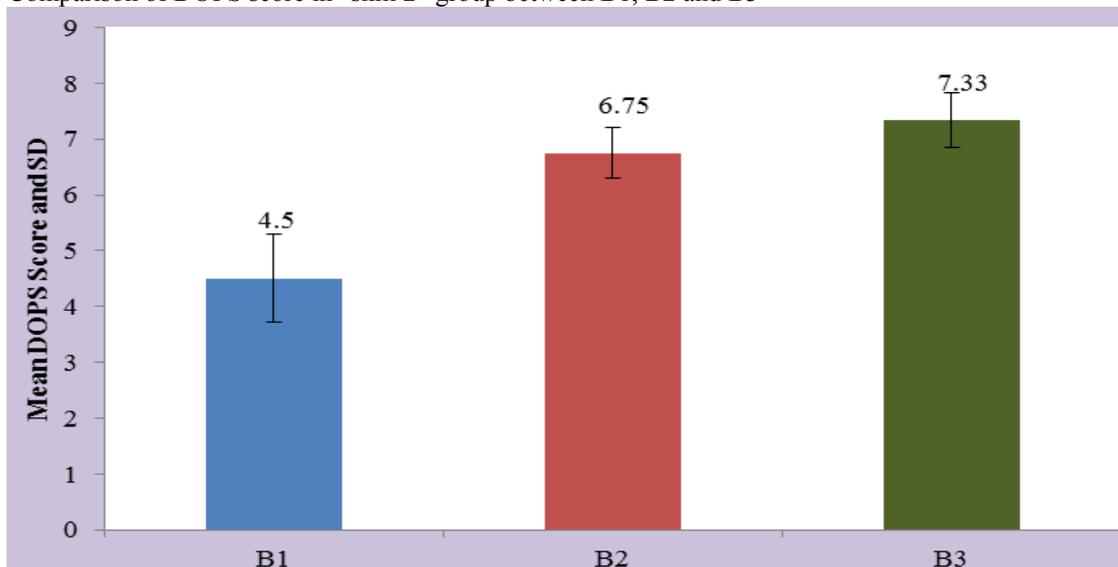
DPOS	Mean	N	Std. Deviation	Std. Error Mean	Mean Difference
A1	3.91	12	0.79	0.22	$2.58 \pm 0.90$
A2	6.50	12	0.52	0.15	$3.33 \pm 0.88$
A3	7.25	12	0.45	0.13	$0.75 \pm 0.45$

Student's paired t test was applied in both groups. In the suturing group, the standard deviation between A1-A2 WAS 0.90 and P value of 0.0001, between A2-A3 SD was 0.88 and P value 0.0001, and SD A2-A3 WAS 0.45 and P value was 0.0001 which was found to be statistically significant.

**Student's paired t test**

Paired Difference	Paired Differences					t	df	p-value
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
A1-A2	2.58	0.90	0.25	2.01	3.15	9.94	11	0.0001, S
A1-A3	3.33	0.88	0.25	2.76	3.89	13.00	11	0.0001, S
A2-A3	0.75	0.45	0.13	0.46	1.03	5.74	11	0.0001, S

In the catheterization group the mean DOPS scores were 4.50 in first encounter B1, 6.75 in second encounter B2 and 7.33 in third encounter B3.

**Graph 2:** Comparison of DOPS score in "skill 2" group between B1, B2 and B3**Table 2:** Comparison of DOPS score in "skill 2" group between B1, B2 and B3 descriptive statistics

DPOS	Mean	N	Std. Deviation	Std. Error Mean	Mean Difference
B1	4.50	12	0.79	0.23	2.25±0.86
B2	6.75	12	0.45	0.13	2.83±0.83
B3	7.33	12	0.49	0.14	0.58±0.51

There was a gross improvement in scores in the third encounter as compared to the first encounter. Student's paired t test was applied SD B1-B2 was 0.86, B1-B3 SD was 0.83, and B2-B3 SD D was 0.51. The P value in all the three was 0.0001 which was statistically significant.

#### Student's paired t test

Paired Difference	Paired Differences					t	df	p-value
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
B1-B2	2.25	0.86	0.25	1.69	2.80	9.00	11	0.0001, S
B1-B3	2.83	0.83	0.24	2.30	3.36	11.75	11	0.0001, S
B2-B3	0.58	0.51	0.14	0.25	0.91	3.92	11	0.002, S

This confirmed our hypothesis that DOPS leads to development and improvement of clinical skills.

#### Discussion

Literature which suggests assessment based on direct observation should be an essential component of outcomes-based education and certification.<sup>6,7</sup> The development of expertise depends on accurate and detailed assessment and feedback.<sup>8</sup> Shahgheibi Sh et al,<sup>9</sup> in their study conducted in the Obstetrics Ward of Kurdistan University of Medical Sciences, found that that the students' skills in interventional group was more correct than control group. T-test showed a significant difference between groups in improvement of all skills ( $p=0.0001$ ). In this study 73 students participated of whom 42 students (57.5%) were in control group, and 31(42.5%) were in intervention group. This was comparable to our study in which the mean DOPS

scores in suturing group were 3.91 in first encounter A1, 6.50 in second encounter A2, and 7.25 in third encounter A3. In the catheterization group the mean DOPS scores were 4.50 in first encounter B1, 6.75 in second encounter B2 and 7.33 in third encounter B3. There was a gross improvement in scores in the third encounter as compared to the first encounter. The P value in both the groups was 0.0001 which was found to be statistically significant.

Shaveta Kundra and Tejinder Singh in their study concluded that DOPS is a feasible and acceptable tool under Indian settings. Direct observation followed by contextual feedback helps postgraduates to learn and improve practical skills.<sup>10</sup> Gina Singh, Tejinder Singh et al found that DOPS can be incorporated in the in-training assessment of undergraduate dental students and seems to have a good feasibility and acceptability.<sup>11</sup>

In a study conducted by Masoumeh Erfani Khanghahi, Farbod Ebadi Fard Azar, the revealed that DOPS tests can be used as an effective and efficient evaluation method to assess medical students because of their appropriate validity and reliability, positive impact on learning and high satisfaction level of students<sup>12</sup>

Nazari Roghieh et al found an improvement in learning of clinical skills (arterial blood sampling and endo- tracheal suctioning skills) of nursing students in the intensive care unit (ICU).<sup>13</sup> Roderick A et al<sup>14</sup> in their study subjected final year students to an online survey regarding student feedback regarding DOPS. They found that 88.7% thought DOPS was easy to use and administer. Students were also very positive about the opportunity that DOPS creates for feedback to a medical student (76.1%). An overwhelming majority (79.6%) agreed that this immediate feedback is helpful to their development. Students also supported the notion (77.3%) that DOPS identifies the developmental needs of a medical student to carry out a procedural skill. This was corroborated by our faculty and students who thought that the DOPS along with feedback given along with it, was helpful in improving the clinical skills.

In the United Kingdom and other parts of the world, although medical students are required to undergo formal and compulsory examinations to test their factual knowledge and decision making, were not required to demonstrate technical ability. Therefore, there exists no objective assessment criterion to test trainees' surgical skill, especially during the exit examination, which, if passed, provides unrestricted license to surgeons to practice their specialties. In the United Kingdom, two new surgical tools (Surgical Direct Observation of Procedural Skill and Procedure Based Assessments) have been simultaneously introduced to assess surgical trainees.<sup>15</sup>

### Conclusion

In the current pattern of traditional education, the assessment of post-graduate students is mostly a summative assessment at the end of three years of residency, which includes theory papers and long and short cases and viva voce. This mostly tests the theoretical knowledge, and the procedural or surgical skills as well as attitudes towards patients are not tested.

At the end of our study it was found that observing, assessing and providing feedback to students enhanced the quality of the clinical skills. The DOPS assessments done repeatedly helped in improvement of clinical skills of post graduate students.

The faculty and postgraduate students had a very positive feedback about the usefulness of DOPS. Both thought that DOPS should be introduced in the department. Because we used open ended questions for feedback and not a Likert scale, feedback could not be quantified.

### Impact of the Study

DOPS should be implemented as a method of formative assessment in the regular curriculum of post-graduate

students. This will go a long way in development of clinical and surgical skills of post-graduate students.

### Limitations of the Study

1. Needs time and effort on part of faculty.
2. Small sample size.
3. Short duration of the study.

### Acknowledgements

1. The post-graduate students in the department for their active participation.
2. Faculties from the department who have helped me conduct the DOPS assessments.

**Conflict of Interest:** None.

### References

1. Miller G E. (1990). Instrument (IPI). Medical Education. 40(11):1105-1114. 3. The assessment of clinical skills/ competence/performance. *Acad Med* 65(Supplement 9):S63-S7.
2. Norcini JJ, McKinley DW. Assessment methods in medical education. *Teach Teach Educ* 2007;23:239-50.
3. Faghani F. Teaching and educational methods: Health educational programs management Improvement health development center of treatment vice-presidency in Iran health and treatment ministry.
4. Sidhu R, Grober E D, Musselman L J, Reznick R K. Assessing competency in surgery: where to begin? *Surg* 2004;135(1):6-20.
5. Darzi A, Smith S, Taffinder N. Assessing operative skill. Needs to become more objective. *BMJ* 1999;318:887-8.
6. Shumway J M, Harden R M, Association for Medical Education in Europe. AMEE Guide No. 25: The assessment of learning outcomes for the competent and reflective physician. *Med Teacher* 2003;25(6):569-84.
7. Crossley J, Humphris G, Jolly B. Assessing health professionals. *Med Educ* 2002;36(9):800-4.
8. Ericsson K A. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. *Acad Med* 2004;79(10):S70-S81.
9. Shahgheibi Sh, Pooladi A, Bahram Rezaie, Farhadifar F, Khatibi R. Evaluation of the Effects of Direct Observation of Procedural Skills (DOPS) on Clinical Externship Students' Learning Level in Obstetrics Ward of Kurdistan University of Medical Sciences. *J Med Educ Winter Spring* 2009;13(1, 2):29-33.
10. Shaveta Kundra and Tejinder Singh. Feasibility and Acceptability of Direct Observation of Procedural Skills to Improve Procedural Skills. *Indian Pediatr* 2014;51:59-60. Department of Pediatrics, Christian Medical College and Hospital, Ludhiana, Punjab, India.
11. Gina Singh, Ravleen Kaur, Anushi Mahajan, Abi M Thomas, and Tejinder Singh. Piloting Direct Observation of Procedural Skills in Dental Education in India. *Int J Appl Basic Med Res* 2017;7(4):239-42.
12. Masoumeh Erfani Khanghahi, Farbod Ebadi Fard Azar, Direct observation of procedural skills (DOPS) evaluation method: Systematic review of evidence. *Med J Islam Repub Iran* 2018(3 June);32.45. <https://doi.org/10.14196/mjiri.32.45>
13. Nazari Roghieh, Hajhosseini Fateme, Sharifnia Hamid, Hojjati Hamid. The effect of formative evaluation using "direct observation of procedural skills" (DOPS) method on the extent of learning practical skills among nursing students in the ICU. *Iran J Nurs Midwifery Res* 2013;18(4):290-3.

14. Roderick A McLeod, Gary J Mires, Jean S Ker. The use of the Direct Observation of Procedural Skills (DOPS) assessment tool in the clinical setting - the perceptions of students. *Int J Clin Skills IJOCS* 2011;5(2):77-82.
15. Memon MA, Brigden D, Subramanya MS, Memon B, Assessing the surgeon's technical skills: analysis of the available tools. *Acad Med* 2010;85(5):869-80. doi: 10.1097/ACM.0b013e3181d74bad.