

# 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

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## ABSTRACT

**Background:** Learning of clinical skills in the intensive care unit (ICU) is important for nursing students. “Direct observation of procedural skills (DOPS)” is a modified objective method in the field of medical sciences, and we conducted this study with the aim of investigating the effect of evaluation using DOPS method on learning practical skills among nursing students in the ICU.

**Materials and Methods:** This semi-experimental study was conducted on 39 nursing students of the 7<sup>th</sup> semester (20 in the intervention group and 19 in the control group). First, the control group students spent their apprenticeship by the routine assessment method. The intervention group underwent formative evaluation using DOPS method in addition to the routine one. At the beginning and end of the period, skill levels of both groups in performing two optional procedures (arterial blood sampling and endotracheal suctioning) were evaluated using checklists, and each student’s skill score was calculated in a range of 0-20. Period initiation and termination scores were considered as pre- and post-test values, respectively.

**Results:** The results showed no significant difference in pre-test scores between the two groups ( $P > 0.05$ ), whereas the mean difference of post-test scores was significant for both procedures between the two groups ( $P < 0.001$ ). Difference between the mean values of pre- and post-test scores of the two procedures for both intervention and control groups was significant ( $P < 0.001$ ).

**Conclusion:** Our findings indicate that DOPS formative assessment, more than the routine approach, increases arterial blood sampling and endotracheal suctioning skills in the ICU. Therefore, it is recommended that this method be used in other wards as well as for other skills.

**Key words:** Clinical evaluation, direct observation of procedural skills, nursing, practical skills

## INTRODUCTION

Functional nature of the nursing profession led to efforts by the researchers for change and improvement in clinical and theoretical training. They should be considered as the existing problem of nursing clinical education.<sup>[1]</sup> To save the lives of patients and improve their health, learning of health care practices is essential.<sup>[2]</sup> Since 1950, simultaneously with fast and serious changes of assessing methods in medical education, new approaches

with optimal serious impact have been developed, mostly focusing on clinical proficiencies.<sup>[3]</sup> One of these methods is “direct observation of procedural skills (DOPS).” In this method, subjects are observed in an environment quite similar to the actual activities, in which there is a real patient and procedure,<sup>[1]</sup> and they focus on important points of the considered skill required to be evaluated. This method makes it easier to provide feedback to students, and contributes to a feedback giving based on actual and perceived behaviors instead of general comments. Therefore, it is not only considered as motivation and learning encouragement for students, but also gives direction to their learning efforts and indicates principal matters, regarding the direct relevance of test style and content with clinical performance.<sup>[4]</sup> It shows how to achieve the desired goals and skills, and motivates learners trying to improve and enhance clinical practice.<sup>[5,6]</sup> However, few studies have been conducted to examine the acceptance of this procedure in medical education.<sup>[1]</sup> Wiles and Shahgheibi, for instance, have shown that using “direct observation of practical skills” has been able to augment

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medical students' skills in neurology and gynecology departments;<sup>[1,7]</sup> nevertheless, despite the importance of modification in the nursing assessment system, there is not yet any report available on the implementation of this method in nursing faculties. Thus, in line with their duty, i.e. finding a way to help the learners achieve optimal performance, the researchers strived to provide an opportunity to do the objective assessment and provide constructive feedbacks by observing students' behavior in real situations. Therefore, this study was conducted with an aim of investigating the impact of evaluation using DOPS method on the extent of learning practical skills among nursing students in the intensive care unit (ICU).

## MATERIALS AND METHODS

This semi-experimental randomized controlled study was performed on the 7<sup>th</sup> semester students of Amol School of Nursing in 2009-2010. Forty-one students were enrolled and randomly allocated in two groups (according to the number of students in the class lists): intervention ( $n = 21$ ) and control ( $n = 20$ ). All the students had spent theoretical course of Intensive Care Nursing with the same instructor and the same teaching method. Guest students and those with non-educational clinical experience were excluded from the study (the possibility existed that the students already have had experience of procedures). Clinical training was held in a single unit (ICU, 17 Shahrivar Hospital, Amol), based on the same lesson plan by one clinical instructor with a master's degree, as follows: the first three groups with six to seven cases were evaluated using the routine logbook assessment (control group) and then the other three groups of six to seven students underwent formative assessment by DOPS method, in addition to the routine evaluation.

Endotracheal suctioning and arterial blood sampling were selected among the skills of this unit (since they had not been trained or practiced in the other sectors, and there had also been enough opportunities for learning and dealing with the related skills in this unit). At the first day of training, students' performance on the two mentioned procedures was diagnostically assessed using the skills standard checklists. At this stage, two students who had previously experienced the techniques were excluded, and the study was continued with 39 students (20 in the intervention group and 19 in the control group). The way of procedures implementation was carried out by the trainer in equal terms for both groups, and they had the chance to observe and repeat these behaviors in the unit. Then, both groups were handed the logbook, based on which they were obliged to do the skills at least three times during the 10-day training course. Whereas the intervention

students were also introduced to DOPS method and passed through it once during the formative evaluation. Observation and feedback-giving processes in DOPS method occurred according to the intervention group's requisition, and both students and patients (non-conscious patients' families) were informed about the students being observed. Participants were separately checked and their performance was recorded in the checklist, and they were given feedback immediately after the end of the procedure. Each student's observation and feedback giving lasted 12-15 and 4-5 min, respectively. The checklist used in the study consisted of two sections: The first part included the student's and the observer's profile, and the second part included procedure-relevant assessment criteria according to defined nursing standards, in which the observer was required to allocate a 1-6 score for each parameter while observing. Thus, score 1-2 was given if it was lower than expected, score 3 if it was at the border, score 4 if it was as expected, and 5-6 was given if it was more than expected; the total score was calculated upon 20. These criteria comprised procedure-performance indication, pre-procedural preparation, required supplies provision, student's technical ability, infection control and aseptic points, post-procedural actions, and overall assessment of the student's function. At the end, the student's strength and weakness points as well as constructive suggestions were written in the cadre; one copy of this page was provided to the instructor and the other one to the student.

At the end of the course, arterial blood sampling and endotracheal suctioning skills were evaluated for both groups, using the checklists, by another assessor with master's degree who was not aware of the evaluation type while training. Eventually, each student received a minimum score of zero and a maximum of 20 for each of the above skills. Higher scores indicated greater proficiency in performing the procedure. The obtained data entered were in SPSS<sub>16</sub> statistical software; Wilcoxon signed ranks test was applied for comparing mean pre- and post-test scores in the two groups, and Mann — Whitney test was used for period-termination scores.  $P < 0.05$  was considered significant for all the study tests. The study was approved by the ethics committee of Babol University of Medical Science.

## RESULTS

The subjects consisted of 39 female students with a mean age of  $22.67 \pm 0.92$  years. They had all been familiar to implementing endotracheal suctioning and arterial blood sampling through studying the book and observing the trainer's performance. In addition, 35 students had seen arterial blood sampling through the film and 8 by

**Table 1: Mean comparison of pre- and post-test scores for arterial blood sampling and endotracheal suctioning procedures in intervention and control groups**

Variable		Intervention group	Control group	U	P value
Arterial blood sampling	Pre-test* (Mean ± SD)	7.55±0.68	7.5±0.74	0.182	0.857
	Post-test (Mean±SD)	18.45±0.49	14.96±0.64	19.07	P<0.001
Endotracheal suctioning	Pre-test (Mean±SD)	7.04±0.66	7.03±0.67	0.056	0.956
	Post-test (Mean±SD)	17.53±0.57	14.59±1.32	9.05	P<0.001

\*Pre- and post-test scores are within the range of 0-20

observing the nurse's hand; 22 were acquainted with suction proceeding by watching the film and 21 through the nurse's performance. During the study period, both groups performed endotracheal suctioning and arterial blood sampling with the average time of  $4.75 \pm 1.25$  times and  $3.21 \pm 0.97$  times, respectively. Our study students were under clinical procedure evaluation by DOPS method for the first time (of course, due to performing arterial blood sampling test after suctioning, they once had DOPS experience). Time duration for observing arterial blood sampling procedure was  $13.55 \pm 1.1$  min with feedback-giving time of  $4 \pm 0.86$  min; for endotracheal suctioning, it was  $14.62 \pm 1.02$  min with feedback-giving time of  $4.1 \pm 0.9$  min.

Table 1 gives the comparison of pre- and post-test scores between intervention and control groups. It shows that there was no significant difference in the pre-test scores between the two groups ( $P > 0.05$ ), while there was a significant difference in the post-test scores for both procedures ( $P < 0.001$ ).

The mean difference of pre- and post-test scores was significant for both procedures between the two groups ( $P < 0.001$ ).

## DISCUSSION

The present study demonstrates that DOPS assessment leads to clinical competency augmentation among nursing students in the ICU. Bazrafkan in his study compared multiple choice question and DOPS methods in evaluating dental students in Shiraz. His study results displayed a direct relationship between the students' mean score and their performance quality.<sup>[8]</sup> Likewise, Shahgheibi has provided some bodies of evidence showing medical students' improved function in Gynecology department by DOPS evaluation.<sup>[1]</sup> In addition to our country, this method has been followed in a number of other countries and has been used as an objective-structured clinical criterion in situational, procedural, and actual time,<sup>[9-12]</sup> and similar desirable results were brought about. Perhaps, one of the reasons

is that when students anticipate a specific test structure, they study more thoughtfully, and any alteration can change their concentration from theoretical issues to clinical ones.<sup>[13]</sup> It is noteworthy that in order to maximize training impact of this method, the subjects' strength and weakness points should be identified, by their help, and compromised. Feedbacks need to be provided with high sensitivity and in a suitable environment immediately after the assessment, and the students' weaknesses be emphasized in addition to the strengths;<sup>[4]</sup> this has been observed in the present study. Although most researchers have admitted positive effect of direct observation of medical trainees, it is still used in small and inadequate numbers.<sup>[14,15]</sup> Experts, however, believe that direct observational assessment should be the main essence of result-based education,<sup>[16,17]</sup> since these evaluations are focused on functional competency and measuring the proficiency objectively and accurately, and the authors' and authorities' efforts are to access a way to ensure that care providers possess sufficient skills at a reliable level.<sup>[18]</sup> By improving new tools such as DOPS, stronger foundations are yielded for research on educational outcomes. Despite the fact that assessments' data can be applied in formative and summative ways, it should be kept in mind that research in this field is limited and only a few studies regarding the use of this method in nursing education are available, and that using this method is challenging in crowded units and postpones patients' care. Such an evaluation can be done in fields in which it is possible to estimate the students' skills in the most effective and efficient manner, i.e. possibility of existing direct observation with adequate numbers.<sup>[4]</sup> The situation provided in the general ICU with 12 active beds made this method applicable for our study investigators, and this could be cited as another reason for DOPS effectiveness in the present study.

## CONCLUSION

On the basis of our findings, it has been concluded that DOPS method, as an objective structured evaluating method with appropriate feedback in formative assessment of nursing students' practical skills, improves the educational influence of ICU training course and increases student

proficiency in arterial blood sampling and endotracheal suctioning more than the routine approach. Therefore, it is recommended that this method be used in other wards as well as for other skills.

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