

## **Research Article**

### **Objective Structured Video Examination – A Novel Evaluation Method of a Complex Psychomotor Skill of FNAC Procedure**

**Dr. P.V. Kiranmayi\***, **Dr. P. Kumudachalam<sup>1</sup>**, **Dr. N. Vivekanand<sup>2</sup>**, **Dr. R. Nagarjunachary<sup>3</sup>**

\*Associate Professor of Biochemistry, Kurnool Medical College, Kurnool, Andhra Pradesh.

<sup>1</sup>Professor of Pathology, Osmania Medical College, Hyderabad, Telangana

<sup>2,3</sup>Associate Professor of Pathology, Rajiv Gandhi Institute of Medical Sciences(RIMS), Adilabad, Telangana, India

#### **\*Corresponding author**

Dr. P.V. Kiranmayi

Email: [kiranmayi.asp@gmail.com](mailto:kiranmayi.asp@gmail.com)

---

**Abstract:** The objective evaluation of clinical competency in the present situation has several limitations. Evaluation of FNAC procedure, a clinical competency, should be accurate, reliable and reproducible. Objective Structured Video Exam (OSVE) fulfils these criteria. OSVE can be used for formative, summative, and remediated evaluations of clinical skills. There are very few studies undertaken on utility and feasibility in assessing psychomotor skills, i.e. clinical competency, by OSVE. This study is to assess the feasibility of OSVE in the evaluation of complex psychomotor skills of FNAC procedure. FNAC procedure performed by the 2nd year 16 pathology junior residents in a procedural station in skill lab was video recorded. Evaluation of the pre-recorded video was done by three faculty evaluators with the performance-based criterion checklists (PBC) having 16 components and a global rating scale of 1-5. An interrater reliability analysis using the Kappa statistic was performed to determine consistency among evaluators. The global rating scores based on performance of FNAC were-Excellent in 18.75%, Very good in 25% good in 12.5%, Pass in 18.75% and Fail in 25% of the residents. Group scores based on performance of clinical examination, FNAC procedural skills and the end stage skills were adequate in 43.75%, 56.25% and 31.25 % respectively. Almost perfect agreement, 100% interrater reliability between the three evaluators was observed. Thus OSVE is a novel, competency based, valid, reliable and objective method of evaluation of FNAC procedure, a complex psychomotor skill. There was no inter-observer variability in the present study.

**Keywords:** Evaluation, Psychomotor skill, FNAC, OSVE, PBC Checklist

---

#### **INTRODUCTION:**

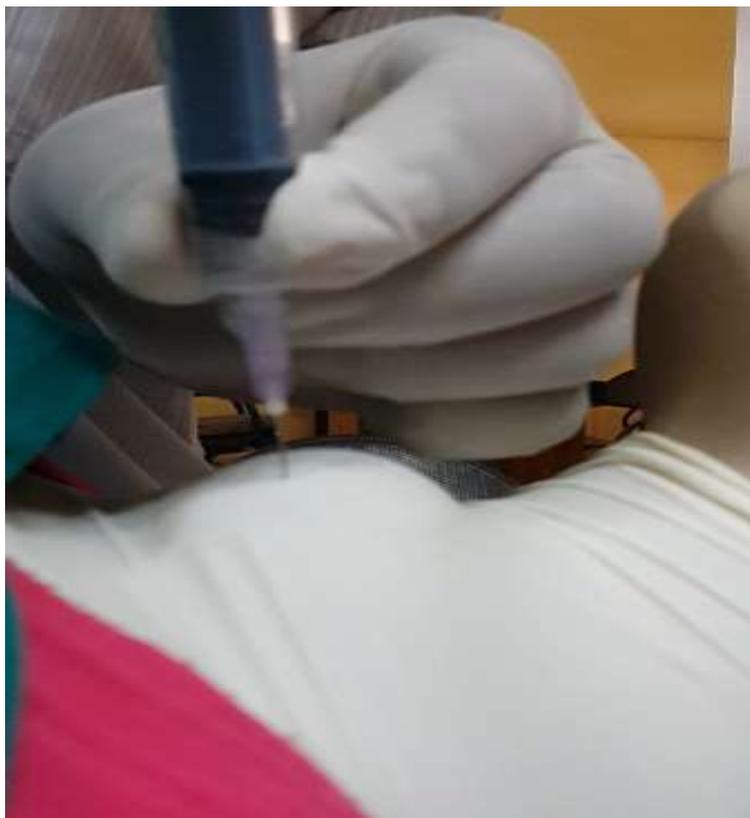
Fine needle aspiration cytology (FNAC) procedure, is a complex, core skill of psychomotor domain. Dr Benjamin S Bloom and RH Dave, explained that the psychomotor domain has the ability to put physical and bodily skills into effect [1, 2]. Miller's Pyramid of Assessment provides a framework for assessing clinical competence. It can assist clinical teachers in matching learning outcomes (clinical competencies) with expectations of what the learner should be able to do at any stage [3].

Evaluation of FNAC procedure, a clinical competency, should be accurate, reliable and reproducible. Objective Structured Video Exam (OSVE) fulfils these criteria. OSVE was first established by Gerald Michael Humpris and Kaney to assess communication skills [4]. The OSVE can be used

for formative, summative, and remediated evaluations of skills [5].

#### **MATERIALS AND METHODS:**

A batch of 16 junior residents of MD pathology was evaluated while performing FNAC procedure by OSVE. A procedural station in a skill lab with a neck swelling in a mannequin was designed and the necessary equipment for the FNAC procedure was provided. The students were instructed before the evaluation regarding the specific skill i.e. FNAC to be performed on the mannequin as they perform on a patient, the task of performing the aspiration under sterile precautions and the time limit to complete the task. Video recording of the procedure was done with maintenance of confidentiality i.e., video recording of only close up view of performer's gloved hands. (Figure-1)



**Fig-1; Performing FNAC procedure**

Performance based evaluation of video recordings using 16 components, PBC checklist (Table-1) was done by three faculty members. The videotapes were subsequently reviewed by three faculty members. The observers were free to rewind the video tapes as often as necessary, to verify the presence or absence of performance of each component listed on the PBC check-list. The individual student's performance levels were assessed using the global rating scale of 1-5. The group scoring was based on performance of 3 components; Clinical examination, FNAC procedure per se and the end stage of the FNAC procedure. The performance level, group scores were calculated and categorised.

Inter observer variability (Interrater reliability a measure of agreement) by three faculty members were derived from performance based 16 component checklist. (Table-6) An interrater reliability analysis using the Kappa statistic was performed to determine consistency among evaluators. Informed consent was obtained from the Residents.

#### **OBSERVATION AND RESULTS**

It was observed that 3 students out of 16 (18.75%) had Excellent score, 4/16 (25%) students had Very Good score, 2/16 (12.5%) students had Good score, 3/16 (18.75%) students had Pass score and 4/16 (25%) students were under- Fail performance level (Table-2).

Group scores are given based on the components in the PBC check list. Out of total 16 students, the clinical examination was performed adequately by 7 students (43.75%); FNAC procedural skills were performed adequately by 9 students (56.25%) and the end stage skills by 5 students (31.25%). The consolidated scores of three faculty evaluators were compared. The Interrater reliability, a measure of agreement between the evaluators was 100% for 12/16 components of the PBC checklist with perfect agreement, Kappa-1.00; The interrater reliability was 80% for 3/16 components with almost perfect agreement, Kappa-0.81 to 1.00 and for only one question the interrater reliability was 50% with moderate agreement, Kappa-0.41-0.60. (Table-3) & (Table-6). There were no inter-observer variability on PBC checklists and there was an almost perfect agreement observed among evaluators.

**TABLE –I: Performance based Criterion Checklist (PBC) for FNAC procedure**

S.NO	QUESTIONS
1.	Is the student wearing the Apron, Gloves and the Mask?
2.	Did she/he perform clinical examination?
3.	Did she/he check for all the equipment for FNAC?
4.	Did the student clean the area with the disinfectant?
5.	Needle insertion --- Near vertical or Tangential?
6.	After needle insertion, negative pressure has been created or not?
7.	Did she/he perform “Back and Forth “movement under negative pressure?
8.	Was the movement unidirectional or multidirectional?
9.	How long did she/he perform this movement?
10.	Did she/he release the negative pressure before needle withdrawing?
11.	Did she/he wipe the area with cotton after withdrawing the needle?
12.	Did she/he get the material?
13.	Did she/he push the material parallel to or perpendicular to the direction of the slide?
14.	Check for proper smearing and placing of slides in the fixatives.
15.	Did she/he dispose the needle and syringe properly?
16.	Total time taken for the procedure

**TABLE-II: The global rating scores (1-5) based on performance of FNAC**

Performance level	Score	Number of students (percentage)
Excellent	> 80%	3 (18.75%)
Very good	75-79 %	4 (25%)
Good	65-74 %	2 (12.5%)
Pass	51-64 %	3 (18.75%)
Fail	50 %	4 (25%)

**TABLE-III: Consolidated scores by four Assessors**

Performance level	Examiner-1	Examiner-2	Examiner-3
Excellent (>80%)	3	3	3
Very good (75-79%)	4	4	4
Good (65-74%)	2	2	2
Pass (51-64%)	3	3	3
Fail (0-50%)	4	4	4

**TABLE-IV: Advantages of OSVE over conventional OSPE**

Conventional OSPE	Video OSPE/OSVE
Assessment of complex psychomotor skills is difficult.	Assessment of complex psychomotor skills is easy and reliable [14].
Artificial breaking of the practical skill into individual competencies occurs, which is not desirable [18].	Artificial breaking of practical skill is totally removed by testing it in a single station and OSVE is akin to natural performance [14].
Consistent objective evaluation throughout the OSPE may not be possible by the assessors.	Consistent evaluation of the entire video recordings possible by the assessors [14].
There is a risk of observer fatigue to evaluate the performance on PBC check lists for all the candidates [18&19].	There is no risk of observer fatigue as video recording can be viewed comfortably at a later time and date [16].
Assessor/observer bias due to familiarity with student may lead to discrepancies in results.	Assessor/observer bias is absent. Confidentiality can be maintained [16].
Feedback by self-analysis is difficult for the student to recollect all the errors made during OSPE and to rectify.	Video replay/Feedback is a definite tool for self-analysis by the student about where his/her strengths and weaknesses lie [7].
Planning & logistics are complicated and consume more time because all stations invariably demand equal time[18,19&20]	Planning & logistics are simple and consume less time [16].
More expensive, human and material costs were required to develop and administer. Needs space for multiple stations [21&22].	More economical to develop & administer. Needs Space for single procedural station.[16].

**TABLE-V: Group scores:**

Group components	Adequacy of performance
Clinical examination	43.75%(7/16)
FNAC Procedure	56.25%(9/16)
End stage of FNAC	31.25%(5/16)

**TABLE-VI= Interrater reliability (Cohen’s Kappa)**

Questions Number	Inter Assessor reliability a measure of agreement-kappa			Overall Question reliability (lowest kappa)
	A Vs B	A Vs C	B Vs C	
1	1.000	1.000	1.000	1.000
2	1.000	0.818	0.818	0.818
3	1.000	1.000	1.000	1.000
4	1.000	1.000	1.000	1.000
5	1.000	1.000	1.000	1.000
6	1.000	1.000	1.000	1.000
7	1.000	1.000	1.000	1.000
8	1.000	1.000	1.000	1.000
9	1.000	0.846	0.846	0.846
10	1.000	1.000	1.000	1.000
11	0.625	0.500	0.871	0.500
12	0.818	0.818	1.000	0.818
13	1.000	1.000	1.000	1.000
14	1.000	1.000	1.000	1.000
15	1.000	1.000	1.000	1.000
16	1.000	1.000	1.000	1.000

Vs= Verse

**INTERPRETATION OF KAPPA:**

Poor agreement = < 0 Kappa; Slight agreement=0.0– 0.20; Fair agreement:-0.21 – 0.40; Moderate agreement:-0.41 – 0.60; Substantial agreement:-0.61 – 0.80; Almost perfect agreement:-0.81 –1.00 [23].

**DISCUSSION**

FNAC is a complex skill of psychomotor domain and a core skill of clinical competency that has to be acquired by the post graduate students with perfection and undergraduates as well, in a day to day medical practice. The success of FNAC depends on perfecting the technique to get an ample and representative cytology sample.

Objective structured video examination - OSVE is a competence based assessment tool, focuses on the details of the psychomotor skills, and is a reliable evaluation tool. Evaluation of multiple competencies on a single occasion including medical knowledge, patient care and professionalism along with psychomotor skills can be done[6]. OSVE is also a good teaching learning tool [7]. Using this method, apart from imparting the core psychomotor skill, the learner can be motivated to attain perfection in the technique.

OSVE was first established by Humphris.G and Kaney.S, by using video recordings to assess communication skills and helps teachers to assess both the declarative and procedural knowledge of students.[8&9] OSVE has been used frequently for assessing clinical communication skills[10]. OSVE clearly reveals the areas of deficiency to be focussed for

remedial measures. The demonstration of a video-recorded benchmark performance in combination with video feedback may significantly improve the student’s performance [11]. It is a simple way of assessing complex core skill of psychomotor domain. The entire procedure of OSVE in a single procedural station was comfortably and conveniently video recorded and evaluated at assessors convenience. Optimum costs in terms of finances, manpower and time needed has to be considered for feasibility and sustainability. OSVE reduces the administrative burden in terms of time and manpower [12, 13].

OSCE breaks down clinical skills into small ‘testable’ tasks. This runs the risk of training doctors who are very good at performing these piecemeal tasks without being able to assimilate them into a coherent assessment [14]. OSVE was more valid and reliable than Traditional Clinical Examination (TCE) and Objective structured physical examination (OSPE)/Objective structured clinical examination (OSCE) because, everyone was assessed with the same task performed on the same mannequin, later observed by the same faculty observers with same PBC checklists. The videotapes were subsequently reviewed by the assessors. In this review, the observers were free to rewind the tapes as often as necessary, to verify the

presence or absence of each of the components listed on the PBC checklists. The skill level and organization of the resident can also influence the ease with which faculty can follow and complete a PBC checklist. Thus, the resident who is disorganized may complete all of the components listed on the PBC checklist, and yet receive a less reproducible score than one who is more organized.[15] OSVE, akin to real time situation, clinical competencies can be assessed adequately. Standardisation of OSCE has two components: the validity of performance and the reliability of performance when faced with different examinees [14].

Scoring in OSVE is not influenced by ethnicity, religion or gender as in TCE and OSCE/OSPE. "Confined video recording" of the psychomotor skill to be assessed eliminates these bias.[16]In TCE and OSCE/OSPE a student can be safely guided out of trouble but in OSVE, the examiners do not communicate with the students and hence cannot correct an erring student and thus eliminates Assessor bias. Some students complained of feeling stressed by the OSCE and not having enough time at the stations.[16] OSVE has the advantage of completion of the skill in a single procedural station without stress to the students and assessors alike. OSVE provides opportunity for self-analysis for the student about where his/her strengths and weaknesses lie. Plan for future training sessions depending on the present level of standard, can be done [14]. OSVE is a competence based assessment and it is a good teaching learning tool [7]. The OSVE is compared with conventional (OSPE) / (OSCE) in - (Table-4).

In the present study PBC Checklist having 16 components, which were observable and measurable, was used for assessment. Global rating scales employed are pertaining to clinical examination, communication skills and diagnostic tasks. A checklist can be provided to assist the examiner in making his judgement of the student's performance, though no marks are decided for each item on the checklist. A global rating, with a scale of 1-5, can enhance the validity and reliability of OSCE [17].The scoring is objective since standards of competence are pre-set and agreed checklists are used for scoring [18].

The Individual score of the student is indicative of the expertise gained in a particular psychomotor skill i.e.; FNAC. There is a wide range in individual scores based on the number of components performed, and ranged from minimum of 6/16 (31.5%) to a maximum of 13/16 (81.25%). This wide discrepancy emphasises the need for skill training in a skill lab even for 2nd year postgraduate students of pathology who have undergone 3 months training in cytology.

The Group score serves as an excellent feedback to the teacher, so that error prone areas can be recognised and remedial measures can be undertaken. The present study group scores-(1) adequate clinical examination 43.75 %; (2) FNAC procedure -56.25%, and [3] the end stage of FNAC-31.25% as shown in Table 5. Since the PBC checklists were designed to promote greater objectivity, it was expected that the variability of checklist scores (i.e., disagreement among faculty evaluators) would tend to be smaller. Also, the faculty using PBC checklists had only a brief introduction to these forms prior to using them. It is possible that agreement would improve as faculty become familiar with a PBC checklist and continued use of and practice at this type of observation and evaluation [15]. It was expected that the evaluators would agree on the scoring of individual items on the PBC checklists (i.e., the percent agreement would be approximately 100% for each item). Inter-observer variability among Faculty is nil in OSVE thus increasing the validity and reliability of the method of evaluation [15]. Patient variability and examiner variability are eliminated thus increasing the validity of the examination [18].

#### CONCLUSION:

OSVE is a valuable tool in measurement of, FNAC procedure, a core skill of psychomotor domain. There was no inter-observer variability in the present study. It is a feasible economical and reliable method of evaluation. It can also be used as teaching- learning tool to impart various practical/ clinical skills. It is a novel method of evaluation of clinical/practical skills when compared to the conventional OSPE/OSCE. It is a valuable tool for both formative& summative evaluation. There is also scope for automation of OSVE and thus evaluation of large number of students by OSVE, removing the human error and bias.

#### ACKNOWLEDGEMENTS:

I am thankful to Dr.Vimala Thomas Professor. & HOD and Dr. Jammy Guru Rajesh, senior resident, Dept. of Community Medicine, Gandhi Medical College, Hyderabad for their support in statistical data analysis.

#### REFERENCES:

1. Bloom BS, Engelhart MD, Furst EJ, Hill, WH, Krathwohl DR; Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain. New York. 1956; David McKay Company.
2. RH Dave; Developing and writing educational objectives: Psychomotor levels. 1970; pp.33-34.
3. Miller G; The assessment of clinical skills / competence / performance: Academic Medicine. 1990; 65 (Suppl.9):S63-S67.

4. Humphris GM1, Kaney S; The Objective Structured Video Exam for assessment of communication skills: Medical Education. 2000;34(11):939-45
5. Rocha M, Rubenstein J; Critical Synthesis Package. Objective Structured Video Examination: MedEd PORTAL; 2014; Publication ID: 9846; Version: 1; Published: July 17
6. Stewart CM1, Masood H, Pandian; Development and pilot testing of an objective structured clinical examination (OSCE) on hoarseness: Laryngoscope.2010 Nov; 120(11):2177-82.
7. Pinaki Wani, ShobhaKini, Vrinda Dalvi; Objective Structured Practical Examination v/s Traditional Clinical Examination in Human Physiology: Faculty's perception: International Journal of Basic and Applied Physiology: IJBAP. 2012; 1(1): 30.
8. Ozlem Surel Karabilgin\*, KevserVatansever, Suleyman Ayhan Caliskan, HalilIbrahim Derek; Assessing medical student competency in communication in the preclinical phase: Objective structured video exam and SP exam: Patient Education and Counselling: 2012; 87 293-299.
9. Humphris G; Communication skills knowledge, understanding and OSCE performance in medical trainees: multivariate prospective study using structural equation modelling: Med Educ 2002; 36:842-52.
10. Baribeau DA1, Mukovozov I; Using an objective structured video exam to identify differential understanding of aspects of communication skills: Medical Teacher: 2012; 34(4):e242-50.
11. Hawkins SC1, Osborne A, Schofield SJ, Pournaras DJ, Chester JF; Improving the accuracy of self-assessment of practical clinical skills using video feedback, the importance of including benchmarks: Med Teach: 2012; 34(4):279-84.
12. Vander Vleuten CPM; The assessment of professional competence: developments, research and practical implications: Adv Health Sci Educ. 1996; 1:41-6.
13. S J Snodgrass E Ashby; Electronic practical skills assessments in the health professions. IJAHSP: 2014; 12(1).
14. Jeremy Wallace, Ranga Rao, Richard Haslam; Simulated patients and objective structured clinical examinations: review of their use in medical education: Advances in Psychiatric Treatment. 2002; 8: 342-348.
15. LaMantia, William Rennie Donald A. Risucci, Rita Cydulka, *et al.*; Interobserver Variability among Faculty in Evaluations of Resident's Clinical Skills: Academic Emergency Medicine. 1999; 6(1).
16. Nkeiruk, Ameh, Mohammed A Abdul, Gbadebo, Solomon Avidime; Objective Structured Clinical Examination vs traditional clinical examination. An evaluation of student's perception and preference in a Nigerian Medical School: NMJ. 2014; 55(4): 310-313.
17. Piyush Gupta, Pooja Dewan, Tejinder Singh; Objective Structured Clinical Examination (OSCE) Revisited: Indian Paediatrics.2010; 47.
18. Ananthakrishnan N: Objective structured clinical/practical examination (OSCE/OSPE): JPGM. 1993; 39(2): 82-4
19. Iantis CVA, Terry Hung, Michael Tong, W C Lee, Andrew van Hasselt Fontaine *et al.*; Summative assessment in Otorhinolaryngology, the Objective Structured Video Examination (OSVE) of final year medical students at the Chinese University of Hong Kong: NZ Med J:2001;114: 314-315
20. Sudan R, Clark P, Henry B; Cost and logistics for implementing the American College of Surgeons objective structured clinical examination: Am J Surg, 2015; 209(1):140-4.
21. Cusimano MD, Cohen R, Tucker W, Murnaghan J, Kodama R, Reznick R: A comparative analysis of the costs of administration of an OSCE (objective structured clinical examination): Acad Med: 1994; 69(7):571-6.
22. Harden RG, Gleeson FA; Assessment of clinical competence using an objective structured clinical examination (OSCE) Medical Education. 1979; 13: 41-54.
23. Landis JR, Koch GG; The measurement of observer agreement for categorical data: Biometrics: 1977; 33:159-174.