

COMPARISON OF SNAPPS AND TRADITIONAL BEDSIDE TEACHING IN ENHANCING CLINICAL REASONING SKILLS AMONG 4TH YEAR MBBS STUDENTS IN OBSTETRICS AND GYNAECOLOGY

Ansa Islam¹, Nowshad Asim², Bushra Mehboob², Brekhna Jamil³, Atyya Bibi Khan¹, Usman Mahboob³

How to cite this article

Islam A, Asim N, Mehboob B, Jamil B, Khan AB, Mahboob U. Comparison of Snapps and Traditional Bedside Teaching in Enhancing Clinical Reasoning Skills among 4th Year MBBS Students in Obstetric and Gynaecology. J Gandhara Med Dent Sci.2026; 13(2):29-34. <https://doi.org/10.37762/jgmds.13-3.825>

Date of Submission: 26-11-2025

Date Revised: 04-06-2026

Date Acceptance: 08-06-2026

¹MHPE Scholar, Institute of Health Professions Education and Research, Khyber Medical University, Peshawar.

²Assistant Professor, Institute of Health Professions Education and Research, Khyber Medical University, Peshawar

³Professor, Institute of Health Professions Education and Research, Khyber Medical University, Peshawar

Correspondence

Brekhna Jamil, Professor, Institute of Health Professions Education and Research, Khyber Medical University, Peshawar

☎: +92-320-9591000

✉: brekhnajamil@kmu.edu.pk

ABSTRACT

OBJECTIVES

To compare the effectiveness of the SNAPPS model versus traditional bedside teaching in enhancing clinical reasoning and learning experiences among 4th-year MBBS students during Obstetrics and Gynecology ward rotations.

METHODOLOGY

A crossover comparative (within-subjects) study was conducted over six months among 43 fourth-year MBBS students at Ayub Medical Teaching Institute, Abbottabad. Each student experienced both traditional and SNAPPS-based bedside teaching. Student perceptions were gathered using a structured questionnaire, and ward test scores (out of 10) were analyzed. Data were processed using SPSS, and paired t-tests were used; $p < 0.05$ was considered significant.

RESULTS

SNAPPS-based teaching produced significantly higher mean scores in case summarization ($p = 0.001$), differential diagnosis ($p = 0.001$), management planning ($p = 0.001$), and total scores ($p = 0.001$), though no difference was observed in history/examination ($p = 0.937$). Student feedback showed strong agreement that SNAPPS improved clinical reasoning, confidence, and active participation, with higher overall satisfaction (39.14 ± 3.97 vs. 25.86 ± 4.15 ; $p = 0.001$).

CONCLUSION

The SNAPPS model significantly outperformed traditional bedside teaching in promoting clinical reasoning, analytical thinking, and student engagement among Obstetrics and Gynecology undergraduates. Its integration into ward teaching is recommended to foster reflective, learner-centered clinical education.

KEYWORDS: SNAPPS, Clinical Reasoning, Bedside Teaching, Obstetrics and Gynecology, Undergraduate Medical Education, MBBS Students.

INTRODUCTION

Clinical reasoning plays a pivotal role in medical education, serving as the cornerstone of accurate diagnosis and effective patient care. Clinical reasoning incorporates the cognitive processes by which physicians systematically gather, interpret, and integrate patient information to reach accurate diagnostic conclusions and formulate appropriate therapeutic decisions.¹ Although widely recognized as a critical competency, teaching clinical reasoning at the undergraduate level often lacks a clear framework, resulting in uneven learning experiences and limited opportunities for students to engage in intentional practice.^{2,3} Traditional bedside teaching remains the dominant approach to clinical training, especially in inpatient departments such as Obstetrics and Gynecology.¹ Although this approach gives students real exposure to patient care, it often remains teacher-centered, stressing the delivery of facts rather than motivating critical thinking or reflective learning.⁴ In

addition, the distinctive sensitivities present in Obstetrics and Gynecology wards, such as concerns about patient privacy and the impact of cultural values, often limit the extent to which students can actively participate in ward-based learning.⁵ To address these limitations, educators have shifted towards student-centered teaching approaches that promote active engagement and enhance diagnostic reasoning skills. Among these, the SNAPPS framework (Summarize, Narrow, Analyze, Probe, Plan, and Select) provides a structured interactive method for guiding case presentations and streamlining meaningful exchanges between learners and teachers.⁶ The SNAPPS model helps learners clarify their clinical reasoning, identify knowledge gaps, and drive self-directed learning. Evidence from several studies indicates that this structured approach strengthens clinical reasoning, improves diagnostic accuracy, and promotes reflective practice more effectively than traditional teaching methods.^{7,8,9} Studies conducted in midwifery and across other health disciplines likewise highlight that the SNAPPS model strengthens communication skills,

improves the quality of history-taking, and supports the development of differential diagnoses.^{10,11,12} Findings from systematic reviews indicate that structured instructional approaches, such as the SNAPPS framework and the One-Minute Preceptor model, enhance learners' ability to justify diagnoses, promote self-directed learning, and improve overall satisfaction with the educational experience.^{13,14} The SNAPPS framework encourages learners to articulate uncertainties and engage in more thorough case analysis, both of which are essential for the development of clinical reasoning.¹⁵ The SNAPPS model offers a structured approach to developing students' clinical reasoning skills in Pakistan, particularly in settings where cultural sensitivities, privacy concerns, and overcrowded Obstetrics and Gynecology wards limit direct patient interaction. By fostering active participation and promoting clarity of thought, SNAPPS facilitates learning even in the context of restricted patient access and demanding faculty schedules. While international research supports the efficacy of SNAPPS, there remains a notable lack of local studies evaluating its potential to address unique challenges in inpatient Obstetrics and Gynecology clinical education, a gap that the present study seeks to address.

METHODOLOGY

This study used a crossover comparative (within-subjects) design in which all participants experienced both traditional bedside teaching and the SNAPPS model. Each student acted as their own control, allowing direct comparison of performance and perceptions across the two teaching methods. The Ethical Clearance certificate was obtained from the Institute of Health Professions Education & Research Ethics Board, Khyber Medical University, Peshawar, and Ayub Medical College, Abbottabad. Informed consent was obtained from all participants, who were assured that their participation was voluntary and that their data would remain confidential. The study was conducted in the Obstetrics and Gynecology Department (Units A and B) of Ayub Medical Teaching Institute, Abbottabad, which serves as a primary clinical training site for undergraduate medical students. The study was carried out over six months, from June 2025 to November 2025. The study included fourth-year MBBS students rotating through the Obstetrics and Gynecology unit, as per their clinical rotation schedule at Ayub Medical Teaching Institute during the study period. All students from the three consecutive rotation batches were eligible for

inclusion. A consecutive sampling approach was used, in which every student who fulfilled the inclusion criteria was enrolled. Students were included if they completed rotations in both Unit A and Unit B, received both teaching methods (traditional bedside teaching and the SNAPPS model), and had no prior exposure to the SNAPPS model. Those who attended only one unit or missed both rotations were excluded. A total of 43 students met the criteria and were included in the analysis. Data collection occurred in two sequential phases, with each batch completing rotations in both clinical units. All batches first rotated through Gynae Unit B, where they received traditional bedside teaching. At the end of a two-week rotation, each student underwent a 10-mark ward assessment test, comprising: history and examination (4 marks), case summarization (2 marks), differential diagnosis (2 marks), and management plan (2 marks). Similar case types were used across both units to ensure comparability. Next, students moved to Gynae Unit A, where the SNAPPS model served as the primary teaching method. On their first day in Gynae Unit A, they attended an orientation session about SNAPPS, and all faculty members had already participated in a workshop on the SNAPPS Model as an innovative teaching method. After two weeks of bedside clinical learning with the SNAPPS Model, students took the same 10-mark ward assessment with the same scoring system, and also completed a nine-question feedback form (score range: 9-45) to share their views on both teaching methods. The questionnaire was adapted from published SNAPPS and clinical-teaching tools, refined through expert Obstetrics and Gynecology and medical-education review, approved institutionally, and piloted with eight students to ensure clarity and relevance.¹⁶ A designated faculty member oversaw the assessments and questionnaires to ensure consistency and confidentiality. Data were analyzed using the latest version of SPSS (27). Outcome variables (assessment scores and feedback ratings) are continuous and are presented as means $\pm$ standard deviations. Because the same students experienced both teaching methods, comparisons between traditional bedside teaching and the SNAPPS model were performed using paired t-tests. Gender-based comparisons were conducted using independent samples t-tests. Statistical significance was set at $p \leq 0.05$.

Figure 1 shows the progression of students through both rotations, beginning with traditional bedside teaching in Gynae Unit B, and progressing to SNAPPS teaching in Gynae Unit A. It also outlines the corresponding ward tests and completion of the feedback questionnaire, leading to final data analysis.

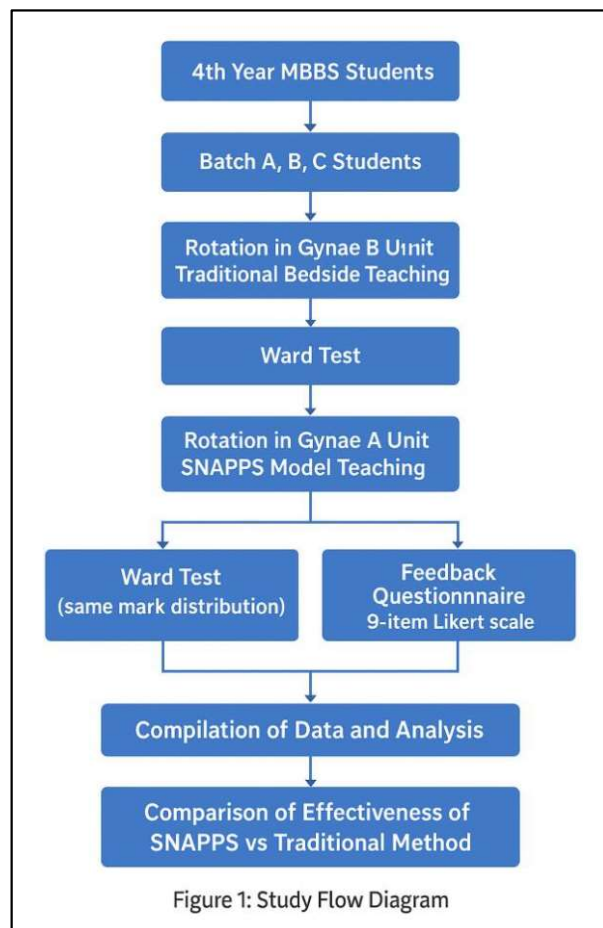


Table 1: Comparison of Mean Test Scores of Students Taught by Traditional and Snapps Methods (n=43).

Test items	Traditional Teaching	SNAPPS Teaching	P value
History & Examination	2.709 ± 0.6756	2.698 ± 0.568	0.931
Summarization	0.663 ± 0.389	1.605 ± 0.444	<0.001
Differential Diagnosis	0.756 ± 0.399	1.326 ± 0.461	<0.001
Management Plan	0.628 ± 0.489	1.070 ± 0.495	<0.001
Total Marks	4.77 ± 0.972	6.77 ± 1.11	<0.001

Table 2: Feedback of Students after Completing both Teaching Methods (n=43).

Feedback items	Tradition Teaching	SNAPPS Teaching	P value
Improved my clinical reasoning skills	2.58 ± 1.26	4.51 ± 0.51	<0.001
Encouraged me to ask questions	3.26 ± 0.85	4.23 ± 0.78	<0.001
Helped me present patient cases confidently.	3.12 ± 0.76	4.42 ± 0.55	<0.001
Provided structured, clear sessions.	3.02 ± 0.597	4.21 ± 0.71	<0.001
Promoted active participation.	3.26 ± 0.76	4.27 ± 0.66	<0.001
Helped apply theory to clinical practice.	2.60 ± 0.88	4.56 ± 0.50	<0.001
Quality of feedback received.	3.05 ± 0.722	3.70 ± 0.89	<0.001
Overall satisfaction with the method.	2.91 ± 0.75	4.44 ± 0.63	<0.001
I would prefer this method in the future	2.07 ± 0.884	4.70 ± 0.513	<0.001

RESULTS

Total 43 students (male 24, 55.8%, female 19, 44.2 %) participated in study, comprising Batch A (n=17, 39.5%; male 11, 64.7%, female 6, 35.3 %), Batch B (n=15, 34.9%, male 8, 53.3%, female 7, 46.7%), Batch C (n=11, 25.6%, male 5, 45.5%, female 6, 54.5%). Based on their rotations in Obstetrics and Gynecology units A and B, as determined by the scheduled clinical curriculum time table.

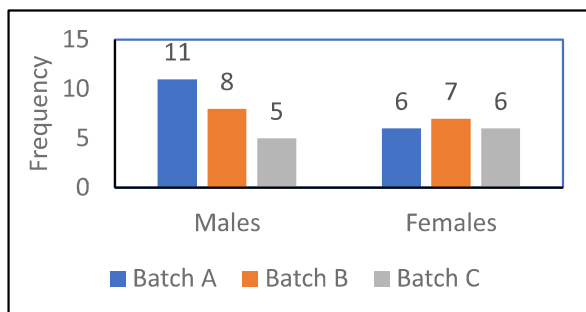


Figure 2: Distribution of gender by batches (n=43)

Table 3: Comparison of Test Scores by Gender for the Traditional and Snapps Methods of Teaching (n=43).

Test items		Males	Females	p value
History & Examination	Traditional	2.688 ± 0.6223	2.737 ± 0.752	0.815
	SNAPPS	2.542 ± 0.55	2.895 ± 0.542	0.042
Summarization	Traditional	0.667 ± 0.381	0.658 ± 0.41	0.943
	SNAPPS	1.521 ± 0.454	1.711 ± 0.42	0.167
Differential Diagnosis	Traditional	0.771 ± 0.39	0.737 ± 0.42	0.785
	SNAPPS	1.354 ± 0.477	1.129 ± 0.45	0.653
Management Plan	Traditional	0.625 ± 0.495	0.632 ± 0.496	0.996
	SNAPPS	1.083 ± 0.545	1.053 ± 0.44	0.843
Total Marks	Traditional	4.75 ± 1.03	4.79 ± 0.92	0.897
	SNAPPS	6.54 ± 0.98	7.05 ± 1.22	0.135

Table 4: Comparison of Feedback Scores by Gender after Completing both Teaching Methods (n=43).

Feedback items		Males	Females	P value
Improved my clinical reasoning skills	Traditional	2.83 ± 1.40	2.26 ± 0.99	0.142
	SNAPPS	4.67 ± 0.48	4.32 ± 0.48	0.022
Encouraged me to ask questions	Traditional	3.46 ± 0.88	3.00 ± 0.75	0.072
	SNAPPS	4.25 ± 0.85	4.21 ± 0.71	0.872
Helped me present patient cases confidently.	Traditional	3.17 ± 0.82	3.05 ± 0.71	0.632
	SNAPPS	4.54 ± 0.59	4.26 ± 0.45	0.096
Provided structured, clear sessions.	Traditional	3.04 ± 0.55	3.00 ± 0.67	0.823
	SNAPPS	4.21 ± 0.78	4.21 ± 0.63	0.992
Promoted active participation.	Traditional	3.29 ± 0.69	3.21 ± 0.86	0.732
	SNAPPS	4.38 ± 0.65	4.37 ± 0.68	0.975
Helped apply theory to clinical practice.	Traditional	2.50 ± 0.93	2.74 ± 0.81	0.385
	SNAPPS	4.71 ± 0.46	4.37 ± 0.49	0.026
Quality of feedback received.	Traditional	3.08 ± 0.58	3.00 ± 0.88	0.712
	SNAPPS	3.67 ± 0.87	3.74 ± 0.93	0.800
Overall satisfaction with the method.	Traditional	2.88 ± 0.68	2.95 ± 0.85	0.758
	SNAPPS	4.67 ± 0.56	4.16 ± 0.60	0.007
I would prefer this method in the future	Traditional	2.08 ± 0.88	2.05 ± 0.91	0.912
	SNAPPS	4.83 ± 0.38	4.53 ± 0.61	0.066

DISCUSSION

The study demonstrates that the SNAPPS teaching model markedly enhances the development of clinical reasoning and case presentation abilities in fourth-year MBBS students during their Obstetrics and Gynecology rotations, outperforming traditional bedside instruction. Statistically significant improvements were observed in case summarization, differential diagnosis formulation, and management planning, whereas no notable differences were observed in basic history-taking and physical examination. Student feedback further emphasized a clear preference for SNAPPS, with reports of greater satisfaction, confidence, interest, and willingness to continue using this approach. These outcomes contribute to the growing body of international evidence suggesting that student-centered learning fosters independence and critical thinking.¹⁷ Such a shift is particularly relevant in clinical education, where teacher-led methods have traditionally dominated bedside teaching. The improvements in reasoning and presentation skills observed here are consistent with trends reported in earlier studies (2009), which show that postgraduate residents trained using the SNAPPS

framework achieved greater diagnostic precision and engaged in more effective management discussions than those taught through conventional methods.¹⁸ Consistent with these findings, Sivaraman observed that the SNAPPS framework significantly enhanced critical thinking and clinical reasoning among surgical undergraduates, crediting these improvements to its structured progression that facilitates case summarization, hypothesis formulation, and active inquiry.⁹ The present study's findings further support SNAPPS's role in promoting advanced cognitive skills, particularly in differential diagnosis and management planning. Within the discipline of Obstetrics and Gynecology, these results are particularly noteworthy. Previous research by Barangard, Afshari, and Abedi demonstrated that midwifery students who received SNAPPS-based instruction exhibited superior abilities in history-taking, communication, and diagnostic reasoning, all of which are competencies assessed in the current study.¹⁹ Similarly, Khasbage, Vagha, and Bhowate reported that dental students participating in SNAPPS-facilitated sessions displayed enhanced clarity in clinical reasoning and increased confidence during case presentations.²⁰ These advancements may be attributed to learners' active engagement in systematically organizing their cognitive processes, as well as to the structured opportunities provided for articulating uncertainties—both of which are central components of the SNAPPS framework.²¹ The present study's findings highlight students' positive perceptions of the SNAPPS approach, underscoring its value as an engaging and empowering instructional method. A majority of participants reported that SNAPPS improved their reasoning ability ($M = 3.55 \pm 1.36$), fostered a greater willingness to ask questions ($M = 3.74 \pm 0.95$), and increased their confidence during case presentations ($M = 3.77 \pm 0.93$). These results align with the observations of Wolpaw, Côté, Papp, and Bordage, who found that learners exposed to the SNAPPS model articulated nearly twice as many diagnostic uncertainties and consistently engaged in richer, more nuanced discussions than peers taught with traditional approaches.²² The greater interaction and active involvement reported in our study are consistent with Sivaraman's conclusion, which highlights that SNAPPS shifts learners from passive recipients of information to active builders of knowledge.¹⁴ Such learner-centered engagement is significant in Obstetrics and Gynecology wards, where privacy concerns often restrict direct hands-on opportunities.⁵ The significant gains in case analysis and reasoning observed in this study mirror the findings reported by Ramazanzade and Ebrahimzade, who found that students trained with the SNAPPS model attained significantly higher reasoning scores compared with peers taught through traditional bedside

instruction.²⁰ A study conducted among final-year MBBS female students in the Pediatric unit demonstrated that SNAPPS Model teaching led to superior post-test performance compared with both OMP and traditional teaching methods, underscoring that structured guidance enhances reasoning even in resource-limited teaching contexts.⁴ Taken together, the findings suggest that SNAPPS serves as an effective bridge between theoretical instruction and practical clinical judgment—an outcome of particular importance in undergraduate medical education. Systematic reviews corroborate these findings, indicating that the SNAPPS model enhances clinical reasoning and diagnostic justification, with SNAPPS yielding higher learner satisfaction and reflective engagement.^{13,15} Additional studies have found that SNAPPS fosters more diagnostic hypotheses and more explicit reasoning, although evidence certainty remains low to moderate. Consistent with these reports, the present study demonstrates that SNAPPS not only elevates student scores but also increases confidence and satisfaction, reflecting both cognitive and affective learning benefits. Notably, SNAPPS has also been shown to improve the quality of ward-based teaching without extending session duration, an important consideration in busy inpatient obstetric settings.²³ Although no significant difference was found in students' performance in basic history and examination domains between groups ($p = 0.937$), this aligns with previous findings, as SNAPPS is designed to enhance reasoning and analytical skills rather than mechanical competencies.¹⁵ Traditional bedside teaching may better support psychomotor skill development, while SNAPPS is more effective for cognitive growth by promoting metacognitive reflection and hypothesis generation.³ Combining both approaches may offer a more comprehensive clinical education.

LIMITATIONS

It was conducted at a single institution with a relatively small sample, which may limit the generalizability of its findings. The evaluation concentrated on short-term learning outcomes and self-reported perceptions, without assessing long-term retention of reasoning skills or their influence on clinical performance. In addition, because reasoning was judged through structured case presentations, the possibility of observer bias cannot be entirely ruled out. Future investigations should therefore consider multicentre designs, longitudinal follow-up, and mixed-method approaches to understand better how SNAPPS contributes to sustained learning and real-world clinical decision-making. Comparative studies examining SNAPPS alongside other reasoning-enhancement strategies, such as the Clinical Reasoning Tool or the One-Minute Preceptor, may also help refine teaching practices across diverse educational contexts.

CONCLUSIONS

The results of this study affirm that the SNAPPS model plays a pivotal role in strengthening clinical reasoning, diagnostic formulation, and management planning among undergraduate students in Obstetrics and Gynecology, while simultaneously fostering active participation and learner confidence. By promoting structured case discussions, SNAPPS enables students to learn meaningfully even through observation-based encounters. Owing to its adaptability, efficiency, and strong student acceptance, the integration of SNAPPS into ward-based teaching at the undergraduate level is strongly recommended. Its adoption offers a practical pathway toward nurturing reflective, analytical, and competent future clinicians.

CONFLICT OF INTEREST: None

FUNDING SOURCES: None

REFERENCES

1. Harden RM, Sowden S, Dunn WR. Educational strategies in curriculum development: the SPICES model. *Med Educ.* 1984;18(4):284–97. <https://doi.org/10.1111/j.1365-2923.1984.tb01024.x> PMID: 6738482.
2. Harden RM, Crosby JR. AMEE Guide No. 20: The good teacher is more than a lecturer—the twelve roles of the teacher. *Med Teach.* 2000;22(4):334–47. <https://doi.org/10.1080/014215900409429> PMID: 21275420.
3. Gordon M, Daniel M, Ajiboye A, Uraiby H, Xu NY, Bartlett R, Hanson J, Haas M, Spadafore M, Grafton-Clarke C, Gasiea RY. A scoping review of artificial intelligence in medical education: BEME Guide No. 84. *Med Teach.* 2024;46(4):446–70. <https://doi.org/10.1080/0142159X.2024.2307560> PMID: 38231676.
4. Shahzad S. Academic culture of Pakistani medical colleges. *Health Prof Educ.* 2020;6(1):59–64. <https://doi.org/10.1016/j.hpe.2019.05.002>.
5. Deng C, Gulseren D, Isola C, Grocutt K, Turner N. Transformational leadership effectiveness: an evidence-based primer. *Hum Resour Dev Int.* 2023;26(5):627–41. <https://doi.org/10.1080/13678868.2022.2135938>.
6. Magaña-Medina DE, Aquino-Zúñiga SP, Valdés-Cuervo AA, Parra-Pérez LG. Transformational leadership and the learner-centred teaching approach. *S Afr J Educ.* 2021;41(2):1–12. <https://doi.org/10.15700/saje.v41n2a1900>.
7. Qazi MA, Aman F, Jadoon M, Rafique M, Khan S, Khan RB. Implementation and evaluation of a needs-based faculty development programme in a medical college of Pakistan: a mixed methods action-research. *J Pak Med Assoc.* 2025;75(11):1714–9. <https://doi.org/10.47391/JPMA.12793> PMID: 40920734.
8. Norman G. Research in clinical reasoning: past history and current trends. *Med Educ.* 2005;39(4):418–27. <https://doi.org/10.1111/j.1365-2929.2005.02127.x> PMID: 15813766.

9. Pascoe JM, Nixon J, Lang VJ. Maximizing teaching on the wards: review and application of the One-Minute Preceptor and SNAPPS models. *J Hosp Med.* 2015;10(2):125–30. <https://doi.org/10.1002/jhm.2296> PMID: 25521426.
10. Schmidt HG, Mamede S. How to improve the teaching of clinical reasoning: a narrative review and a proposal. *Med Educ.* 2015;49(10):961–73. <https://doi.org/10.1111/medu.12775> PMID: 26212625.
11. Ali S, Jamil B, Ali L. Effectiveness of various teaching methodologies in developing clinical reasoning skills in undergraduate female medical students. *Khyber Med Univ J.* 2018;10(2):84–8. <https://doi.org/10.35845/kmuj.2018.17766>.
12. Mohamed ER, Almulhem MA, AlElq AH, Zeeshan M, Alharbi RS, Almuhanha AE, et al. Obstetrics and gynecology patients' perceptions about bedside teaching at a Saudi teaching hospital. *J Fam Community Med.* 2024;31(2):168–75. https://doi.org/10.4103/jfcm.jfcm_229_23 PMID: 38687149.
13. Wolpaw TM, Wolpaw DR, Papp KK. SNAPPS: a learner-centered model for outpatient education. *Acad Med.* 2003;78(9):893–8. <https://doi.org/10.1097/00001888-200309000-00010> PMID: 14507619.
14. Jain V, Rao S, Jinadani M. Effectiveness of SNAPPS for improving clinical reasoning in postgraduates: a randomized controlled trial. *BMC Med Educ.* 2019;19(1):224. <https://doi.org/10.1186/s12909-019-1670-3> PMID: 31291991.
15. Gopinath D, Narayan R. Effectiveness of One-Minute Preceptor model and SNAPPS model as clinical tools for postgraduate teaching: a comparative study. *Int J Sci Res.* 2023;12(1):45–49.
16. Sivaraman A. Effectiveness of SNAPPS teaching model in general surgery for improving critical thinking and clinical reasoning skills in Phase III MBBS students: a prospective randomized mixed-methods study. *Int J Sci Res.* 2025;14(2):34–8.
17. Barangard H, Afshari P, Abedi P. The effect of the SNAPPS method versus teacher-centered education on clinical gynecology skills of midwifery students in Iran. *J Educ Eval Health Prof.* 2016;13:25. <https://doi.org/10.3352/jeehp.2016.13.25> PMID: 27493963.
18. Feijó LP, Pereira GA, Ruffini V, Valente F, Dos Santos RA, Fakhouri Filho SA, et al. Effectiveness of SNAPPS in psychiatric residents assessed using objective structured teaching encounters: a case-control study. *Sao Paulo Med J.* 2022;140(4):359–65. <https://doi.org/10.1590/1516-3180.2021.1028.R1.13072022> PMID: 36259849.
19. Khasbage S, Vagha S, Bhowate R. Efficacy of SNAPPS in critical thinking and understanding by dental undergraduates in oral medicine. *J Clin Med Educ.* 2018;9(1):23–30.
20. Grünwald STF, Grünwald T, Ezequiel ODS, Lucchetti ALG, Lucchetti G. One-minute preceptor and SNAPPS for clinical reasoning: a systematic review and meta-analysis. *Intern Med J.* 2023;53(4):452–60. <https://doi.org/10.1111/imj.16005> PMID: 36448464.
21. Teixeira SFG, Grünwald T, Ezequiel ODS, Lucchetti ALG, Lucchetti G. One-Minute Preceptor, SNAPPS, and traditional teaching in the acquisition of clinical reasoning skills by medical students. *Med Educ.* 2017;51(8):823–35. <https://doi.org/10.1111/medu.13022> PMID: 28480606.
22. Flores-Cohaila JA, Vizcarra-Jiménez SF, Bermúdez-Peláez MF, Váscos-Román FF, Rivarola-Hidalgo M. Effects of SNAPPS in clinical reasoning teaching: a systematic review with meta-analysis of randomized controlled trials. *Diagnosis (Berl).* 2024;11(3):123–31. <https://doi.org/10.1515/dx-2023-0149> PMID: 38349856.
23. van der Leeuw RM, Lombarts KMJM, Heineman MJ, Arah OA. Systematic evaluation of the teaching qualities of obstetrics and gynecology faculty: reliability and validity of the SETQ tools. *PLoS One.* 2011;6(5):e19142. <https://doi.org/10.1371/journal.pone.0019142> PMID: 21559275.
24. Bhardwaj V, Zhang S, Tan YQ, Pandey V. Redefining learning: student-centered strategies for academic and personal growth. *Front Educ.* 2025;10:1518602. <https://doi.org/10.3389/educ.2025.1518602>.
25. Wolpaw T, Papp KK, Bordage G. Using SNAPPS to facilitate the expression of clinical reasoning and uncertainties: a randomized comparison group trial. *Acad Med.* 2009;84(4):517–24. <https://doi.org/10.1097/ACM.0b013e31819a8cbf> PMID: 19318792.
26. Wolpaw T, Côté L, Papp K, Bordage G. Student uncertainties drive teaching during case presentations: more so with SNAPPS. *Acad Med.* 2012;87(9):1211–7. <https://doi.org/10.1097/ACM.0b013e3182628fa4> PMID: 22836838.
27. Ramazanzade K, Ebrahimzade A. Comparison of the effect of two clinical education methods—SNAPPS and conventional—on medical students' clinical reasoning skills. *Iran J Med Educ.* 2018;18:107–13.
28. Alam NN, Haque S, Khain IK, Mushroor S. Perspectives of medical students on attributes of bedside teaching. *Int J Community Med Public Health.* 2020;7(5):1652–6. <https://doi.org/10.18203/2394-6040.ijcmph20201962>.
29. Chen J, Chen X, Wu Y, Shi W. Application of SNAPPS combined with One-Minute Preceptor teaching method in emergency internship training. *Creat Educ.* 2022;13(3):778–87. <https://doi.org/10.4236/ce.2022.133050>.
30. Sawanyawisuth K, Schwartz A, Wolpaw T, Bordage G. Expressing clinical reasoning and uncertainties during a Thai internal medicine ambulatory care rotation: does the SNAPPS technique generalize? *Med Teach.* 2015;37(5):456–60. <https://doi.org/10.3109/0142159X.2014.947936> PMID: 25154742.

AUTHORS CONTRIBUTION

Ansa Islam - Concept & Design; Data Acquisition; Data Analysis/interpretation; Drafting Manuscript; Critical Revision; Final; Approval

Nowshad Asim - Concept & Design; Data Acquisition; Drafting Manuscript; Critical Revision; Supervision; Final; Approval

Bushra Mehboob - Concept & Design; Data Acquisition; Data Analysis/interpretation; Drafting Manuscript; Critical Revision; Final; Approval

Brekhna Jamil - Concept & Design; Data Acquisition; Data Analysis/interpretation; Drafting Manuscript; Final; Approval

Atyya Bibi Khan - Concept & Design; Data Acquisition; Drafting Manuscript; Supervision; Final; Approval

Usman Mahboob - Concept & Design; Data Acquisition; Drafting Manuscript; Supervision; Final; Approval

The authors accept responsibility for all aspects of the work and will ensure that any concerns regarding the accuracy or integrity of any part are properly investigated and resolved.



LICENSE: JGMDS publishes its articles under a Creative Commons Attribution-NonCommercial-ShareAlike license (CC-BY-NC-SA 4.0).

COPYRIGHTS: Authors retain the rights without any restrictions to freely download, print, share and disseminate the article for any lawful purpose.

It includes scholarly networks such as Research Gate, Google Scholar, LinkedIn, Academia.edu, Twitter, and other academic or professional networking sites.