

## Original Research Article

# Formative assessment and documentation of history taking in pediatrics: a comparative study

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## ABSTRACT

**Background:** Medical educators have valid concerns over the deteriorating documentation skills of medical students after obtaining a pediatric history. Formative assessment enhances learning by providing feedback to the learners. Though formative assessments are popular in medical education, data to establish their educational benefits are lacking. This study was conducted to assess the areas of concern in pediatric history taking and to determine the effect of formative assessment on documentation skills.

**Methods:** This comparative study involved 80 MBBS students of eighth semester during pediatric clinical postings of one-month duration. At the end of first session, students interviewed a standardized patient and documented the history in a case record. Marks were awarded based on the check list. Feedback was imparted based on the case record. Students' perception was collected through the questionnaire. The same teaching learning methodology was carried out in the second session. Data obtained from the questionnaire and marks scored was analysed.

**Results:** Documentation of growth and development (1.89 + 0.59), immunization history (2.01 + 0.53) were the concern areas identified in our study. Among 80 students, the low achievers in the first and second session was 66 and 13 respectively. The perception of students about their repertoire of interviewing skills was statistically significant ( $p < 0.05$ ). Formative evaluation had a statistically significant effect on the knowledge and performance of students, particularly low achievers ( $p < 0.05$ ).

**Conclusions:** Formative assessment process identified the areas of concern in pediatric history taking and enhanced the documentation skills following immediate feedback. It had a beneficial effect on the students' confidence, enthusiasm, learning and performance.

**Keywords:** Feedback, Formative evaluation, Interview, Low achievers, Medical education

## INTRODUCTION

Assessment drives learning.<sup>1</sup> Appropriate assessment methods help students understand the focal points of the course curriculum; improve their confidence level, enthusiasm, and creativity in learning. Formative

assessment [FA] serves learning by providing feedback to the learners, resulting in an improved medical training along with transparent and credible assessment.

It acts as the most effective educational practice when it comes to improving academic excellence.

The documentation of important clinical information is poor even in the hospital charts of patients with serious conditions. This quality of care has implications for health services and outcomes research, including the development of report cards.<sup>2</sup> Case records act as a bridge between students and facilitators during undergraduate years. In medical practice, it is a necessary legal tender corroborating the correct diagnosis and management. Methods to improve “comprehensive and accurate” documentation skills through appropriate established systems need to provide adequate importance, time and resources.<sup>3-7</sup>

History taking is an art that require the clinician to listen effectively to complaints of the patients. It is the foundation on which the diagnosis of any clinical condition rests. A skilfully elicited history leads to an accurate provisional diagnosis, thus reducing the range of investigations. Avoiding unnecessary investigations save considerable amount of time and resource. A proper history gives a detailed account of onset, progression and duration of various complaints with relevant positive and negative history to aid in diagnosis. It is valid that a clinician will conduct between 100,000 and 200,000 patient interview in the course of his or her professional life.<sup>8</sup> It is the most important, sensitive, powerful and versatile instrument available to doctors in clinical practice.

Pediatric history taking significantly deviates from a standard medical history as the child may not communicate effectively with the care giver and hence collateral history is often necessary. It is unique in a way that extra topics like immunisation, development and birth history need to be covered. Nutrition history has to be analysed in detail including breast feeding and weaning. The interview session is likely to be compromised when the child is ill, and the parents are extremely distressed. Such challenging situations warrant adequate training in targeted history taking during undergraduate training in medical education.

A good history reveals the patients’ ideas, concerns and expectations as well as accompanying diagnosis. Listening to the patients’ perspective is the heart of good history taking. It takes time, practice, patience, understanding and concentration to develop adequate interviewing skills. Medical students must be trained in the diagnostic reasoning skills from the case history to arrive at an appropriate diagnosis. Making diagnosis has often been taught as a long and complicated process.<sup>9</sup> But it can be made easier by a skilled history taking from the patient. Some researchers emphasise the communication skills may deteriorate if they are not periodically activated and practised.<sup>10,11</sup>

Advancement in technology and its excessive application in diagnosis along with lack of clinical teaching has led to a decline in the documentation skills of undergraduate students and interns.<sup>12,13</sup> Improvement in technology has

changed the diagnostics and management of diseases. Despite these advances in science and medicine, a physician’s core clinical skills are interpersonal.<sup>14-16</sup> Over 80% of diagnosis are made on history alone, a further 5-10% on examination and the rest on investigation.<sup>17</sup>

Medical students are instructed to elicit a standard comprehensive history for all patients to arrive at a provisional diagnosis.<sup>18,19</sup> Various studies have shown that the case records lacked essential data on the medical history. History taking, and physical examination notes were incomplete with discrepancies between the observed histories and the documented records implying a deterioration in the written skills.<sup>20-22</sup>

Students with adequate history taking skills training put forth relevant questions and conduct a structured interview session by responding appropriately to the patients verbal and nonverbal cues eliciting quality information necessary to the diagnosis based on the chief complaints.<sup>23,24</sup> Proper case records lead to accurate dissemination of information among medical professionals and ensure early detection of changes in patients’ health<sup>25</sup>.

The new millennium has led to drastic changes in undergraduate medical education from knowledge based curriculum towards competency-based one which aimed at achieving intended learning outcomes. Educational practices that improve documentation skills in authentic health care settings are the need of the hour. Feedback, the critical element of formative assessment, enhances skills by informing students of their progress, strengths, weaknesses and motivate them to engage in purposeful learning activities to achieve the intended result. A mutual understanding of the learning goals between the learner and facilitator facilitates the provision of useful feedback and the interpretation of feedback for enhanced performance. Despite its known merits in promoting learning, use of feedback for improving performance is often not well utilized in medical education.

Present evaluation methods using DOCEE [Direct Observation Clinical Encounter Examination] and OSCE [Objective Structured Clinical Examination] are conducted at the end of clinical postings and hence timely feedback is not provided to the students. They get to know their performance in the form of marks or grades at the end of postings. There is no clarity of what is being tested; whether it is of skills in eliciting history or interpreting the results of the patient interview or both along with proper documentation. It ultimately becomes the test for the students’ factual knowledge. Very few studies are available in India that have evaluated the role of FA in assessing medical student’s performance.

Hence the present study was conducted to identify the concern areas in the various domains of a Pediatric history and to analyse the effect of FA in improving the documentation skills of undergraduate medical students.

Aims and objectives of this study were to identify the competency gaps in documentation of pediatric history taking, to assess the effect of formative assessment on documentation of Pediatric history taking skills among undergraduate medical students and to assess the effect of formative assessment on low-achievers.

Research over a period of 8 months. Approval from the institutional ethics committee was obtained prior to the study. Informed consent was taken from the study participants. 80 undergraduate medical students of eighth semester were posted in batches of 10 on rotation for one-month duration.

**METHODS**

This is a comparative study conducted at the Department of Pediatrics, Karpagam Faculty of Medical Sciences and

The postings were split into two session of 15 days duration each.

**Table 1: Structured questionnaire.**

Name:	Session:	Roll No:
Rate the following domains of a Pediatric interview based on your understanding on a scale of 5 (strongly agree) to 1 (strongly disagree).		
<b>Components of history taking</b>	<b>Strongly agree (5)</b>	<b>Agree (4)</b>
Chief complaints	<b>Neutral (3)</b>	<b>Disagree (2)</b>
History of illness	<b>Strongly disagree (1)</b>	
Past history		
Family history		
Personal history		
Growth and development		
Immunisation history		
Antenatal history		
Nutrition history		
Socio economic history		
Drug history		
	<b>Yes</b>	<b>No</b>
The time given to document was adequate.		
The aims and objectives of the session was clearly communicated to me		
Feedback during the tenure of posting was helpful to my learning.		
The feedback was immediate and relevant to my learning experience:		
I was able to identify my competency gaps during the session.		
Do you wish to have similar feedback session in other clinical postings?		
The feedback motivated and increased my confidence.		
<b>Any additional comments for the teacher</b>		
<b>Signature of student</b>		
<b>Signature of teacher</b>		

To begin with, the students were given a check list with key details of how to conduct a Pediatric interview and ensure proper documentation of Pediatric history taking. At the start of the first session, students were informed about the teaching learning schedule and the assessment method.

Students’ opinion about the session was collected through the structured questionnaire. The case sheet records were scrutinized based on the checklist and marks awarded. The areas of concern were identified, and a constructive feedback was given to the students on one to one basis. The learners received feedback on all components including the omitted ones with a written comment to reinforce the feedback provided verbally. The salient points of history taking were re-emphasized during the second half of posting.

Contact classes on history taking, examination and case sheet documenting skills were conducted by the faculty. At the end of first session (pre-feedback), the students were instructed to interview a standardized patient for 30 minutes and document the findings. The case record was evaluated using the check list. There were eleven domains in history taking and five marks was allotted each for a total of 55 marks.

By the end of second session (post feedback), students were allowed to interview a standardized patient and details recorded within 30 minutes. Post feedback session opinion was again collected and compared.

The case sheet records were scrutinized and assessed based on the checklist. Proper care was taken not to divulge the details of standardized patients prior to the exams.

Uniformity was maintained regarding case scenarios provided to the students through standardized patients. The marks awarded were verified by a senior faculty member in the department of pediatrics.

The ability to document a structured case record and the effect of feedback was analysed and the data interpreted using IBM SPSS 23.0 statistical analysis software.

#### **Inclusion criteria**

80 MBBS students of eighth semester.

#### **Exclusion criteria**

Students not having 100% attendance in all the sessions.

#### **RESULTS**

80 undergraduate medical students of eighth semester were taken up for the study.

**Table 1: Analysis of first and second session questionnaire.**

Component	N	Mean score		SD		t-score	Sig (p)
		First	Second	First	Second		
Chief complaint	80	3.13	3.83	0.73	0.77	-8.934	0.00*
History of illness	80	2.55	3.30	0.65	0.78	-7.897	.004*
Past history	80	2.58	3.45	0.63	0.71	-10.398	0.001*
Family history	80	2.63	3.43	0.64	0.70	-9.297	0.001*
Personal history	80	2.80	3.19	0.53	0.63	-5.722	0.00*
Growth and development	80	2.41	3.16	0.66	0.71	-10.379	0.00*
Immunization	80	2.53	3.34	0.57	0.69	-11.047	0.00*
Antenatal	80	2.61	3.35	0.66	0.76	-8.693	0.00*
Nutrition	80	2.50	3.10	0.61	0.68	-7.618	0.00*
Socio-economic	80	2.59	3.31	0.63	0.78	-9.613	0.00*
Drug	80	2.75	3.09	0.73	0.69	-4.359	0.00*

\*p<0.05 is statistically significant

**Table 2: Analysis of first and second session marks.**

Component	N	Mean marks		SD		t-score	Sig (p)
		First	Second	First	Second		
Chief complaint	80	2.69	3.21	0.68	0.86	-5.139	0.003*
History of illness	80	2.29	2.91	0.71	0.73	-6.975	0.00*
Past history	80	2.30	3.21	0.68	0.80	-10.429	0.00*
Family history	80	2.31	3.10	0.62	0.68	-11.963	0.00*
Personal history	80	2.18	2.98	0.68	0.74	-8.156	0.023*
Growth and development	80	1.89	2.71	0.59	0.67	-13.51	0.00*
Immunization	80	2.01	2.76	0.53	0.62	-11.072	0.00*
Antenatal	80	2.36	2.98	0.64	0.71	-8.747	0.00*
Nutrition	80	2.10	2.80	0.54	0.70	-9.717	0.00*
Socio-economic	80	2.29	2.93	0.66	0.70	-9.495	0.00*
Drug	80	2.38	3.05	0.66	0.65	-10.616	0.00*

\*p<0.05 is statistically significant

At the end of first session, the students' opined that growth and development (mean 2.41±SD 0.66) was most difficult domain followed by nutrition (2.50±0.61). In the second session the student's felt nutrition (3.10±0.68) was challenging followed by growth and development (3.16±0.71). In the first session students perceived chief complaints (3.13±0.73) to be easy followed by personal history (2.80±0.53) whereas chief complaints (3.83±0.77)

followed by past history (3.45±0.71) was best understood in the second session. The perception of the students' about understanding various components of history taking is significantly higher in the post feedback session (p<0.05).

In the first session, the areas with competency gap in documentation of pediatric interview was growth and

development ( $1.89\pm 0.59$ ) followed by immunization ( $2.01\pm 0.53$ ). It is worth noting that the areas of concern at the end of second session was growth and development ( $2.71\pm 0.67$ ) followed by immunization ( $2.76\pm 0.62$ ). At the end of the first session, written recording of chief complaints ( $2.69\pm 0.68$ ) and drug history ( $2.38\pm 0.66$ ) was accomplished better than the other components. In the second session after feedback documentation of chief complaints ( $3.21\pm 0.86$ ) and past history ( $3.21\pm 0.80$ ) was recorded better than the other components of the pediatric interview. There was a statistically significant difference between the test scores in the first and second session following feedback ( $p < 0.05$ ).

**Table 3: Analysis of test scores of low achievers.**

Session	N	N <sub>1</sub> **	Mean marks	SD	t score	sig
First session	80	66	22.97	2.360	-21.319	0.00*
Second session	80	13	30.80	4.148		

\* $p < 0.05$  is statistically significant; \*\*N<sub>1</sub>: number of students scoring  $< 50\%$  of the total marks.

Out of total 55 marks, 66 students have scored less than 50% of marks in the first session whereas 13 students were in the low achievers' category in the second session following feedback. There was a statistically significant difference between the test scores among low achievers before and after the feedback ( $p < 0.05$ ).

## DISCUSSION

The present study identifies the competency gaps in the documentation of Pediatric history and demonstrates that FA augments the interviewing skills of undergraduate medical students. FA is a key process to effective learning, learning environment and students' self-regulation.<sup>26,27</sup> Feedback was provided with a greater degree of sensitivity in a suitable setting immediately following assessment with added emphasis on the students' weaknesses in addition to the strengths.<sup>28</sup>

The students' feedback collected through the structured questionnaire revealed that growth and development ( $2.4\pm 0.66$ ) was the most difficult domain followed by nutrition ( $2.50\pm 0.61$ ) in the first session before feedback. In the second session following immediate feedback provided by the facilitators, the students' felt nutrition ( $3.10\pm 0.68$ ) was challenging followed by growth and development ( $3.16\pm 0.71$ ).

At the end of first session, students perceived chief complaints ( $3.13\pm 0.73$ ) as the easiest domain followed by personal history ( $2.80\pm 0.53$ ) whereas chief complaints ( $3.83\pm 0.77$ ) and past history was understood better in the second session. The students' opinion regarding the challenging areas improved positively after the feedback session. Effective communication between the patient

and physician is directly related to the clinical outcome. Students are trained from their second year in their medical schools to take focussed history relevant to case scenario. They are taught that this approach offer them the best chance of identifying medical issues requiring attention.<sup>29</sup> In the first session FA act as a learning tool evoking previous knowledge acquired during second and third years and help reconstruct knowledge, skills and attitude.<sup>30</sup> It provides the learners with an educational tool to identify concern areas which allows him/her to correct the identified deficiencies.<sup>31</sup> It clarified desired outcomes, enhanced intrinsic motivation and confidence to identify the gaps in knowledge by habitual and judicious use of communication, technical skills, clinical reasoning, values and reflection in practice.<sup>32</sup>

In the second session appropriate feedback focussed on improving students' performance. The minimum and maximum marks scored in the first session was 18 (33%) and 38 (69%) respectively. At the end of second session, minimum and maximum scores were 24 (44%) and 43 (80%) respectively. It was timely received immediately after the first session while the students were into the content of the posting. Supportive learning environment and teachers act as facilitators in assimilating feedback. The need for dedicated assessment moments and teaching time results in overall improvement.<sup>33</sup> In both the sessions the tested competencies are performance or work based ('shows' and 'shows how') as well as knowledge based ('knows' and 'knows how').

In both the sessions, the competency gap regarding the domains were development and immunisation. Growth and development is a dynamic and continuous process. All the developmental milestones in the domains of gross motor, fine motor, social and behaviour including speech and language was assessed. Volume of data increases proportionately with the age of the child. Immunisation is a simple, safe and effective way to protect children from serious diseases. It is imperative to extract the vaccination details from care givers to advice appropriately regarding pending vaccination. With advent of newer vaccines apart from those administered in routine universal immunisation program schedule, the vaccination data increases with the child's age. Incomplete documentation about optional vaccines and pulse polio doses was noted during analysis in our study.

In the first session, the most understood domain during the interview was regarding chief complaints and drug history, whereas it was the chief complaints and past history in the second session. Chief complaints were recorded in the patients' own words in chronological order according to the sequence of events with relevant information collected from the standardized patients. Details about past illness including episodes of similar illness, course of illness and hospitalisation, drug allergy, current and previous medications, response to treatment, side effects, contact history were documented correctly as per checklist. This detailed information are imparted in

the other branches of medicine too. The knowledge imbibed in the previous semesters along with constant reinforcement in other clinical postings could have played a role in better understanding and improved performance during assessment in both the sessions.

FA improved students' drive, motivation and confidence to excel in the overall scheme of assessment. While it increased the performance of all students, it produced good results even with low achievers by concentrating on specific problems with their work, giving them a precise understanding of what is generally wrong and how to put it right with the clear understanding of the targeted course.<sup>34</sup> Out of 80 students, 60 (75%) were satisfied with the teaching learning experience in the first session whereas 80 (100%) students had positive opinion after feedback. Regarding the time allotted to complete the interview and documentation, 64 (80%) and 78 (97.5%) students responded positively during the first and second session respectively.

Medical educators strive to enhance academic standards and research over methods to improve quality in education. Both teaching and writing are difficult and complex. However timely, ongoing and immediate feedback during the session help students identify their deficiencies and rectify them resulting in quick documentation to produce adequate case records. All the ways of teaching and assessment strategies have their own pros and cons. FA for learning raise student achievement, provide educators with base information to plan future learning activities, involve students as decision makers and contributors to their own learning. Students assume ownership and control of their learning.

The high achievers may be more likely to utilise feedback in improving their performance and self-assessment during routine learning activity. As achievement of low scorers improve, the performance gap between high and low high scorers reduce. Overall performance is enhanced with better understanding of the assessment and teaching learning cycle.

The type of assessment is a challenge for the medical teachers to facilitate ongoing and lifelong learning to nurture an ideal Indian medical graduate (IMG). FA with appropriate feedback improves the history taking skill of medical students, improves the educational influence during training and increase their proficiency on documentation skills more than the conventional approach.

Students should be educated about the importance of writing complete patient records as deficiencies lead to errors which may be compromise health care and endanger patients' wellbeing. The process helped the instructor to observe the gap between desired and actual performance and provide relevant feedback to close the performance gap, investigate the basis for the weaknesses

and help correct the deficiencies through assessment and feedback.

In the present study, enhanced faculty supervision and formative evaluation of history taking had a positive effect on learning.<sup>35</sup> Bedside teaching and increased supervision improve their clinical skills. The students valued the interview of standardised patients as instructive and helpful to develop their own strengths and to identify certain kinds of behaviour to improve.<sup>36</sup> The simulated assessments assess students in an environment that closely resembles what a physician will encounter in medical practice. The use of physical stimulators has a reliability, validity, generalisability coefficient, as well as correlation with written examination.<sup>37</sup>

The most daunting task would be to continue ongoing feedback throughout the tenure of clinical postings. For ethical reasons and privacy concerns, the research was done with standardised patients. The students' interview of the standardised patient was not observed by the facilitator. As only the case records were graded and analysed there is a possibility that certain information collected by the students were not documented properly. On the contrary documentation of the interview doesn't guarantee the students' application of their knowledge to reach the provisional diagnosis. This study was performed in a single centre with students from the same semester. Follow up studies may be performed on a large number of students undergoing different postings and the results can be analysed and compared. Although the majority of learners found the formative evaluation an enriching experience, there were few misdirected ideas about its goal, implying that the learners interpreted its role as preparation for final university examinations. This may be alleviated with better communications to the students by stressing upon the difference between summative and formative assessment throughout the curriculum.

## CONCLUSION

The experiment conducted shows that formative assessment does have important influence on students' writing excellence. By shifting our focus to formative assessment, we discovered we had more time to analyse students' work in progress. The facilitators should focus on the formative assessment tools with a purpose-driven instruction, systems for collecting and analysing student work, and ways to organize responses to the errors.

It helps teachers to rectify students' errors and improve upon their strengths through feedback.

The teaching learning method, analysis of questionnaire, assessment and feedback effectively proves that formative assessment is helpful to improve students learning interest, confidence and enhances their documentation skills during undergraduate years.

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