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Effectiveness of Case-Based versus Simulated Patient-Based Teaching on Prescription Writing Skills in Undergraduate Medical Students

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ABSTRACT

Background: Errors in prescription writing remain an important cause of preventable healthcare issues. Although medical students receive conventional teaching on prescription writing, their practical prescribing skills often remain inadequate due to limited hands-on exposure. This study was undertaken to compare the effectiveness of Simulated patient-based teaching versus traditional case-based teaching in enhancing prescription writing skills among second-year MBBS students.

Methods: A prospective comparative study was conducted on 100 students after an introductory session on WHO-based prescription writing guidelines. Students were allocated into two groups: Group A (n=50) received patient-based teaching, while Group B (n=50) received case-based teaching for the same five common clinical scenarios. Prescriptions written by both groups were evaluated using a 19-point scoring checklist. Group A students were also asked to submit feedback.

Results: The mean prescription scores were significantly higher in Group A (17.89) compared to Group B (10.2), as analyzed using the Mann–Whitney U test ($p<0.001$). Chi-square analysis of individual parameters showed that Group A performed significantly better in essential elements such as prescriber registration number, contact details, drug name, strength, formulation, dosing instructions, total quantity, and duration of therapy. Feedback from Group A strongly favored the Simulated patient-based approach.

Conclusion: Simulated Patient-based teaching proves to be a more effective educational strategy than conventional case-based teaching for improving prescription writing competency among undergraduate medical students

Key-words: Prescription writing, Simulated patient-based teaching, Case-based teaching, Medical education

INTRODUCTION

A prescription is a formal written instruction provided by a healthcare professional to guide a patient's treatment. It plays a vital role in ensuring appropriate patient care. The term is derived from the Latin words "pre" (before) and "scribe" (to write) [1].

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Since medical students are future prescribers, they must acquire comprehensive knowledge and competence in prescription writing. This task is not simple—it demands accurate clinical judgment, sound understanding of pharmacological agents, clear communication skills, and familiarity with therapeutic principles.[2] In practice, various prescription-related mistakes such as irrational drug use, inappropriate dosing, and errors of omission or overuse often contribute to compromised treatment outcomes [3]. Despite being a standard component of the medical curriculum, many students still demonstrate inadequate prescribing skills, both during academic assessments and in real-world clinical settings [4].

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Research indicates that most prescribing mistakes are unintentional and largely stem from insufficient hands-on training. Furthermore, several graduates report a lack of confidence in prescribing even after exposure to traditional teaching formats such as lectures or case discussions [5]. This underscores the urgent need to explore and implement more effective educational approaches to enhance prescription-writing proficiency among medical students.

Patient-based teaching is an educational approach that involves learning directly from real patients in a clinical setting. It offers near-authentic exposure and is considered more relevant for future medical practice. Because this method allows students to learn in a real clinical context, it may facilitate better understanding and retention of prescribing skills. [6]

In view of this, the present study was conducted to compare simulated patient-based teaching and case-based teaching in enhancing prescription-writing skills among second-year MBBS students, and to evaluate the effectiveness of simulated patient-based teaching as an educational intervention to improve their prescribing competence.

MATERIALS AND METHODS

Study Design and Setting- This was a prospective, comparative study conducted among second-year MBBS students at Ananya College of Medicine and Research, Kalol, Gujarat, from August 2025 to September 2025.

Study Participants- A total of 100 second-year MBBS students who were willing to participate were included in the study. Written informed consent was obtained from all participants before enrollment.

Teaching Intervention- Initially, all participants received an introductory session on prescription writing based on World Health Organization (WHO) guidelines, which included the standard prescription format and principles of rational drug selection.

The students were then randomly divided into two groups:

- **Group A (n = 50):** Simulated patient-based teaching
- **Group B (n = 50):** Case-based teaching

Five common clinical conditions—peptic ulcer, migraine, bronchial asthma, cough, and constipation—were selected for teaching prescription writing in both groups.

Simulated Patient-Based Teaching (Group A)- Students in Group A underwent simulated patient-based teaching in the skills laboratory. Trained simulated patients represented the selected clinical conditions. Each student was given 10 minutes to interact with the simulated patient, obtain relevant clinical information, and subsequently write a prescription based on the encounter.

Case-Based Teaching (Group B)- Students in Group B were taught prescription writing in the Clinical Pharmacology laboratory using case-based scenarios for the same five clinical conditions. After discussion of each case, students were instructed to write prescriptions in the standard format.

Assessment of Prescription Writing- Prescriptions written by students in both groups were evaluated using a pre-designed 19-point prescription scoring checklist (Table 1). Each student wrote prescriptions for all five clinical conditions, and the average score was calculated.

Table 1: Prescription Scoring Checklist

S. No.	Particulars
1	Doctor's full name
2	Doctor's qualifications
3	Registration no.
4	Address of doctor
5	Contacts: - (of prescriber)
6	Date of prescription
7	Patient's full name
8	Patient's full address
9	Patient's sex
10	Patient's age
11	Patient's weight
12	R_x - superscription
13	Name of the medicine
14	Strength of the drug
15	Dosage form
16	Dosing instructions
17	Total quantity of medicine and duration of medication
18	Specific instructions, if any
19	Doctor's signature & date

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Feedback Assessment- Feedback was collected from Group A students using a pre-validated questionnaire. The questionnaire included closed-ended items based on a 5-point Likert scale to assess learning experience and satisfaction, along with open-ended questions to obtain opinions and suggestions regarding simulated patient-based teaching.

Statistical Analysis- Data were analyzed using appropriate statistical tests. The mean prescription scores of both groups were compared using the Mann–Whitney U test. Individual parameters of the 19-point scoring checklist were analyzed using the Chi-square test. A p-value of <0.05 was considered statistically significant.

Ethical Considerations- The study was approved by the Institutional Ethics Committee of Ananya College of Medicine and Research, Kalol. Permission was obtained from the concerned department heads before the commencement of the study.

RESULTS

The results were analyzed using the Mann–Whitney U test and the Chi-square test. Each of the five prescriptions written by every student was evaluated using a pre-validated checklist. The average score for each student was calculated, and the mean scores were compared between the two study groups. The mean score for the five prescriptions in Group A (based on the 19-point scale) was 18.02, while that for Group B was 13.48 (Fig. 1).

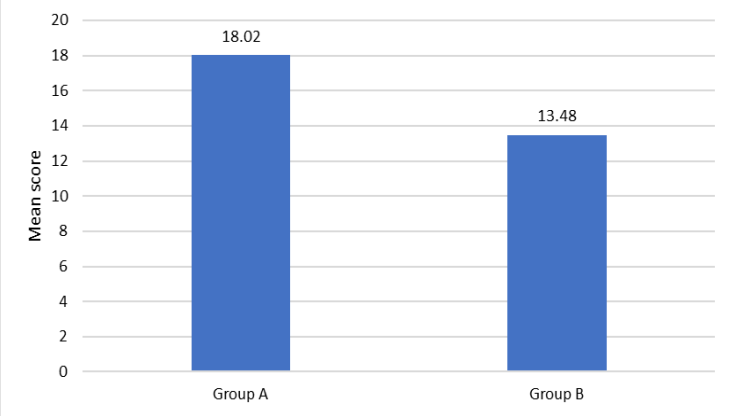

Fig. 1: Comparison of mean score of both groups

Comparison of the mean scores of both groups using the Mann–Whitney U test revealed a statistically significant difference between them (p<0.001). The performance of students in both groups was further evaluated for each of the individual parameters included in the 19-point scoring checklist. A total of 250 prescriptions from group A and 250 prescriptions from group B were analyzed using the Chi-square test. A significant difference was observed between the groups in several parameters, including documentation of the doctor's qualifications, registration number, prescriber's contact details, patient's complete address, patient's weight, name of the medicine, drug strength, dosage form, dosing instructions, total quantity prescribed, duration of therapy, and specific instructions, if any (Table 2).

Table 2: Comparison Of Individual Prescription Parameters On 19-Point Score

Parameters	Number of correct responses (Group B, n=50)	Number of correct Response (Group A, n=50)	Significance
Doctor's full name	235	240	Not significant
Doctor's qualifications	190	210	*p*<0.001
Registration no.	160	240	*p*<0.001
Address of the doctor	236	240	Not significant
Contacts of the prescriber	160	220	*P*<0.001

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Date of prescription	236	242	Not significant
Patient's full Name	236	241	Not significant
Patient's full address	172	242	$p<0.01$
Patient's sex	242	244	Not significant
Patient's age	238	242	Not significant
Patient's weight	72	248	$p<0.001$
Rx – superscription	250	250	Not significant
Name of the medicine	224	242	$p<0.001$
Strength of the drug	170	240	$p<0.001$
Dosage form	172	240	$p<0.001$
Dosing instructions	54	220	$p<0.001$
Total quantity of medicine and duration of medication	02	220	$p<0.001$
Specific instructions, if any	02	242	$p<0.001$
Doctor's signature & date	236	242	Not significant

Feedback from students about the various aspects of the learning activity using a Likert scale is shown in Table 3. The satisfaction index for each item was calculated using the following formula: [8]

$$\frac{[(n_1 * 1) + (n_2 * 2) + (n_4 * 4) + (n_5 * 5)] * 20}{(n_1 + n_2 + n_4 + n_5)}$$

Here, n denotes the total number of students who obtained the score indicated in the subscript for a particular item. The scores were evaluated on a 1–100 satisfaction index scale, with the highest score (96.52) observed for item 5 and the lowest (87.65) for item 3.

Table 3: Responses to questions with a 5-point Likert scale

Questions	Strongly Agree (5)	Agree (4)	Neither Agree nor Disagree (3)	Disagree (2)	Strongly Disagree (1)	Satisfaction index
Simulated Patient-based teaching improved my learning skills	26	22	02	0	0	90.83
Simulated Patient-based teaching is a good tool for teaching & learning	24	22	02	2	0	88.33
Simulated Patient-based teaching provided a context that helped me retain relevant information	20	26	02	1	0	87.65
Simulated Patient-based teaching can help in developing communication skills	40	10	03	0	0	96
This method should be included in early years of MBBS	38	08	02	2	0	96.52

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Analysis of the open-ended responses from Group A students revealed that they found the simulated patient-based teaching sessions engaging and valuable. The sessions were perceived to significantly improve their communication abilities, boost their confidence, and strengthen their understanding of clinical diagnosis. Students also felt that this approach enabled them to establish a clearer connection between diseases and appropriate treatments. Many suggested that similar sessions should be incorporated more frequently into pharmacology teaching.

DISCUSSION

A prescription is a written instruction provided by a healthcare professional for a patient. The ability to write prescriptions for common ailments is a vital core competency for medical undergraduates, requiring an integration of knowledge, clinical judgment, and practical skills. Since inappropriate prescribing can lead to medication errors and associated risks, every prescriber must be capable of prescribing drugs safely and effectively to minimize the likelihood of such errors.[9]

Case-based prescription training is included in the subject of pharmacology in the existing undergraduate medical curriculum. However, it is stated that case-based teaching would not be very effective for skills like prescribing, patient education and doing procedures.[10] Therefore, there is a need for new educational interventions to improve prescribing.

Considering the above facts, the present study has been carried out to check whether the Simulated patient-based teaching is useful in improving the prescribing skills in the Undergraduate MBBS students. The main findings of the present study are discussed below.

In our study, the prescription writing skills of group A students who are trained by Simulated patient-based teaching are significantly better than those of group B, who are trained in case-based teaching. Some of the studies have mentioned poor prescribing skills in fresh medical graduates.[9] A Nigerian study emphasises a more practice-based teaching of prescription writing, as this study has reported a mismatch between knowledge of drugs and prescribing skills among final year students.[11]

Analysis of the individual parameters of the 19-point score between both groups showed no significant difference in variables such as doctor's full name, the doctor's address, date of prescription, patient's full name, patient's sex, patient's age, Rx superscription, and the doctor's signature & date. This shows that the students of group B could not memorize the drug information and reproduce it during prescription writing.

On the other hand, there was a significant difference noted between the groups in variables such as doctor's qualifications, registration no, contacts of prescriber, patient's full address, patient's weight, name of the medicine, strength of drug, dosage form, dosing instructions, total quantity of medicine and duration of medication, and specific instructions, if any. Information regarding the contacts of the prescriber is important because it may be lifesaving if the patient faces any adverse drug events. The lack of a registration number may amount to serious negligence on the part of the doctor. Standard prescription writing is not just writing the drugs and dose alone; every element in a prescription is essential for both legal and therapeutic requirements.[12]

The above findings of our study confirm that patient-based teaching improves the prescription writing skills of students compared to traditional case-based teaching.

Simulated Patient-based teaching method offers advantages to the students, such as communication with patients, understanding their problems and empathy towards patients, which helps them to gain real-life experience to enhance their memory and performance in prescribing writing. Feedback obtained from the students also brought out the fact that the Simulated patient-based teaching was interesting, improved their learning skills, provided a context that helped them in retaining relevant information and in developing communication skills, confidence, and knowledge of clinical diagnosis. They also found it helpful in learning the correlation of disease and treatment and asked for more such sessions of Simulated patient-based teaching in pharmacology. Group A students also voted that the Simulated patient-based teaching is a good tool for teaching &learning and therefore, this method should be included in the early years of MBBS. Our study results agree with the study done by Thenrajan *et al*. [13]

Although we have not included the legible handwriting in our scoring system, it has been reported that illegible handwriting may lead to serious medication errors.[14] Interestingly, in our study, the handwriting of most participants was legible and comprehensible.

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CONCLUSIONS

The present study demonstrates that simulated patient-based teaching is more effective than traditional case-based teaching in improving prescription writing skills among undergraduate medical students. Learning in a near-real clinical context enables better understanding, retention, and application of prescribing principles. Students trained using simulated patients showed superior performance in essential prescription components, reflecting improved competence and preparedness for real-world clinical practice. Prescription writing is a core clinical skill that requires integration of pharmacological knowledge, clinical judgment, and communication skills. Simulated patient-based teaching provides a realistic and structured learning environment that facilitates this integration. Incorporating this teaching method early in the undergraduate medical curriculum may enhance prescribing confidence and reduce future medication errors. Based on the findings of this study, simulated patient-based teaching should be encouraged as a complementary teaching strategy for prescription writing training in medical education.

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