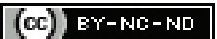


Comparison of Conventional Small Group Teaching with Skill-based Teaching in the Proper Use of Drug Delivery Systems in Phase II MBBS Students of a Medical College in New Delhi, India: A Randomised, Crossover Experimental Study

AMIT ARYA¹, SUNITA SINGH²

ABSTRACT

Introduction: The conventional small group teaching method primarily focuses on the knowledge aspect of Bachelor of Medicine and Bachelor of Surgery (MBBS) students. However, under the Curriculum Based Medical Education (CBME) framework, the National Medical Council (NMC) has introduced a new method of small group teaching called skill-based teaching for Phase II MBBS students. This method includes skill training and communication training in the proper use of Drug Delivery Systems (DDS), in addition to the knowledge aspect.

Aim: To compare the conventional method of small group teaching with skill-based teaching in terms of learning the proper use of DDS in Phase II MBBS students.

Materials and Methods: The present randomised, crossover experimental study was conducted in the Department of Pharmacology at North Delhi Municipal Corporation Medical college, Hindu Roa Hospital, New Delhi, India, over a period of six months July 2022 to December 2022 to assess knowledge (cognitive domain), skill (psychomotor domain), and communication (affective domain). The students were initially

given a questionnaire (pretest) followed by a didactic lecture on DDS. They were then randomly divided into two groups. Group A received skill-based teaching for insulin pen, while Group B received conventional teaching. The groups were then crossed over for Metered Dose Inhaler (MDI) training. After the teaching sessions, the students were given the same questionnaire (post-test). All students were assessed for their skill in using the device and their communication skills. The scores of the two groups were compared using an unpaired t-test.

Results: A total of 51 students (31 males and 20 females; age range 18-20 years) participated in the study. There was a significant improvement in the questionnaire scores between the pretest and post-test ($p < 0.0001$). In the skill-based teaching group, there was a significant improvement in the students' performance in using MDI ($p < 0.05$) and in communication of insulin pen ($p = 0.0001$). Similar results were observed in the skill of using insulin pen and the communication aspect of MDI in both groups.

Conclusion: Skill-based teaching resulted in similar or better performance in terms of skill and communication in the use of DDS compared to conventional teaching methods.

Keywords: Communication, Knowledge, Motor skill, Teaching methods

INTRODUCTION

Education of MBBS students in India has undergone a major change [1]. The National Medical Council (NMC), which governs the education of Indian Medical Graduates (IMG), implemented CBME for MBBS students in 2019 [1]. These changes were made after 21 years [2]. CBME emphasises skills and communication in addition to students' knowledge.

One crucial aspect of MBBS teaching is the use of various DDS in patient care [3]. The use of DDS involves knowledge (cognitive domain), skills (psychomotor domain), and communication (affective domain) [4]. However, in earlier conventional teaching methods, the focus was primarily on knowledge, with skill and communication aspects being ignored [5]. Students were taught about DDS in lectures, and practical demonstrations by faculty were provided. Students were not given hands-on training to perform step-by-step use of these devices themselves. Consequently, many MBBS students, even after completing their studies, were unable to properly use these devices [6].

Another important aspect of using DDS is effectively communicating the proper technique to the patient [7]. If healthcare professionals

themselves are not proficient in using the device, effectively communicating the technique to the patient becomes challenging [8].

In light of these limitations, CBME now mandates both skill training and communication training for the use of DDS, in addition to the knowledge aspect [9].

Previous studies have compared tutorial versus seminar methods of conventional small group teaching, conventional small group teaching versus the jigsaw teaching method, and small group teaching with didactic lectures or interactive lectures [10-13]. However, there is limited data on the comparison of different small group teaching methods and conventional small group teaching [10-12,14]. The present randomised crossover experimental study compared two small group teaching methods (conventional versus skill-based) in learning the proper use of DDS (skill and communication) in Phase II MBBS students at North DMC Medical College in Delhi.

MATERIALS AND METHODS

The present was a randomised, crossover experimental study conducted at North Delhi Municipal Corporation (DMC) Medical

College, New Delhi, India for a period of six months (July-Dec 2022). Sixty Phase II MBBS students from the Batch of 2020 were included in the study. Approval from the Institutional Ethics Committee was obtained (IEC/NDMC/2022/135). Written informed consent was obtained from all study participants (Phase II MBBS students).

Inclusion criteria: Phase II MBBS students from the Batch of 2020 at North DMC Medical College and Hindu Rao Hospital in Delhi.

Exclusion criteria: Students who were absent or unwilling to participate in the study.

Study Procedure

The faculty of the Pharmacology Department were briefed about the study design.

Two Drug Delivery Systems (DDS) were taught in present study: insulin pen (AllStar® pen; Sanofi India Limited) and MDI (Salbair® transhaler; Lupin India). Two faculty members were involved in module preparation and student teaching, while two separate faculty members assessed and evaluated the students. Several sources and references were reviewed to prepare and validate the modules on the step-by-step use of DDS and their communication [15-18]. A validated, structured questionnaire was prepared to assess the students' knowledge [Annexure 1,2]. There were 15 questions for each DDS. Students were awarded one mark for each correct answer and zero for each wrong answer. Separate checklists were prepared for the assessment of skill and communication domains of teaching [Annexure 3-5] [19].

Students were made aware of the research project. First, the baseline knowledge of the students was assessed using validated, structured questionnaires on both DDS (pretest), which were shared online using Google Forms. Next, the theory part of the entire DDS was taught to all students through interactive large group teaching sessions, with pre-formulated learning objectives as per CBME guidelines [20].

Following the lecture, the study continued in the pharmacology practical classes. During the first pharmacology practical class, the students were randomly divided into two groups, Group A and Group B, using simple randomisation.

Group A was taught using skill-based teaching, while Group B was taught using conventional small group teaching for the first DDS (insulin pen). In skill-based teaching, students watched instructional videos on how to use the DDS. The tutor demonstrated the steps in front of the students, and then each student practiced and learned the steps of using the insulin pen and MDI on their own. Group A also received instruction on the communication aspect of using the insulin pen. After this, the students were evaluated again using the same questionnaire (post-test).

Following this, the students' skill in using the insulin pen, along with their communication skills, was assessed on simulated patients using checklists. The assessment was conducted by two faculty members who were unaware of the teaching methodology adopted by the two groups.

For the second DDS (MDI), the students were crossed over, and Group B received skill-based teaching along with communication training for MDI, while Group A received conventional teaching in the next practical class. The assessment of the students was conducted in a similar manner to the first practical class. However, the teaching faculty remained the same to ensure consistency in the teaching methods. The rest of the procedure was similar to the first practical class.

After completing both DDS, the students' scores in the Google Form were calculated, and the difference between the pretest and post-test scores was evaluated. Additionally, the difference in skill in using the DDS and communication about the DDS between the two groups was determined.

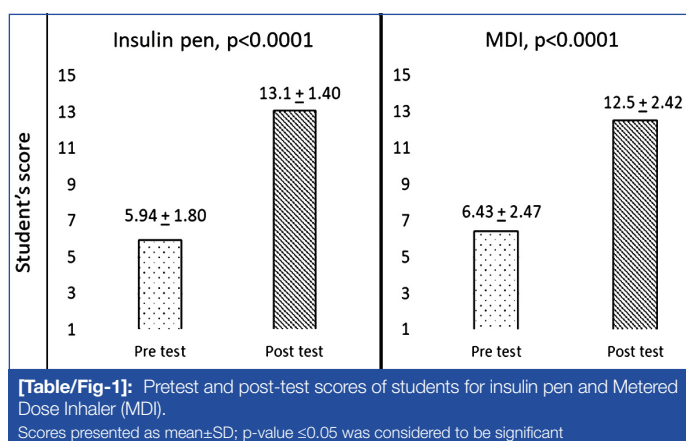
The perception of students and faculty was assessed using a 5-point Likert scale [21] for both teaching methods. The students' and faculty's perception questionnaires were based on similar studies conducted previously on new teaching methodologies for MBBS students [22,23]. The questionnaires were validated and approved by senior faculty members from the Pharmacology and Internal Medicine Departments who were members of the Medical Education Unit (MEU).

STATISTICAL ANALYSIS

The data was exported to a Microsoft Office Excel spreadsheet, and the analysis was conducted using Statistical Packages for Social Sciences (SPSS) version 21.0. The scores of the two groups were compared using an unpaired t-test. A p-value <0.05 was considered statistically significant.

RESULTS

Out of the 60 students, 51 were present in the class and attempted the pretest questionnaire before the lecture. Among these, 31 were male and 20 were female, with an age range of 18-20 years. The average score of the students on the pretest was 5.94/15 for insulin pen and 6.43/15 for MDI, serving as their baseline knowledge of the DDS. In the post-test, the average score of the students significantly increased to 13.1/15 for insulin pen ($p < 0.0001$) and 12.5/15 for MDI ($p < 0.0001$) [Table/Fig-1].



[Table/Fig-1]: Pretest and post-test scores of students for insulin pen and Metered Dose Inhaler (MDI).

Scores presented as mean ± SD; p-value ≤ 0.05 was considered to be significant

In the skill assessment of the insulin pen, the skill-based teaching group achieved an average score of 7.63/10, while the conventional teaching group scored 7.29/10 ($p = 0.59$, not significant). However, a significant difference was observed in the communication aspect of using the insulin pen with the simulated patient, with the skill-based teaching group scoring 7.58/10 and the conventional teaching group scoring 5.58/10 ($p = 0.0001$) [Table/Fig-2].

Score	Skill-based teaching	Conventional teaching	p-value
Insulin pen			
Skill	7.63 ± 1.91	7.29 ± 2.49	0.59
Communication	7.58 ± 1.79	5.58 ± 1.41	0.0001
Metered Dose Inhaler (MDI)			
Skill	8.79 ± 1.22	7.74 ± 1.18	0.0042
Communication	7.63 ± 1.50	7.78 ± 1.38	0.72

[Table/Fig-2]: Comparison of skill and communication of insulin pen and Metered Dose Inhaler (MDI) between skill-based teaching Group and conventional teaching group.

Score presented as mean ± SD

For MDI, the conventional teaching group had significantly lower skill scores compared to the skill-based teaching group ($p = 0.0042$). In the assessment of MDI communication, the conventional teaching group scored an average of 7.78/10, while the skill-based teaching group scored 7.63/10 ($p = 0.72$) [Table/Fig-2].

The students' perception of skill-based teaching was very positive [Table/Fig-3]. A total of 45 out of 47 students (95.8%) found skill-based teaching interesting, and all students agreed that it led to better retention of knowledge. They also felt that skill-based teaching

Parameters	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I had better clarity about what I was expected to learn in skill-based teaching as compared to conventional small group teaching	1 (2.1%)	1 (2.1%)	0	15 (31.9%)	30 (63.8%)
Skill-based teaching has improved my understanding of Drug Delivery System (DDS)	1 (2.1%)	0	0	18 (38.3%)	28 (59.6%)
Skill-based teaching of this module better assisted in retention of knowledge as compared to conventional small group teaching	0	0	0	18 (38.3%)	29 (61.7%)
I found skill-based teaching to be more interesting than conventional small group teaching	0	0	2 (4.3%)	13 (27.7%)	32 (68.1%)
Skill-based teaching has prepared me in a better way to demonstrate DDS in front of patient as compared to conventional small group teaching	0	0	3 (6.4%)	16 (34%)	28 (59.6%)
I had a better understanding of how this module would be assessed in skill-based teaching as compared to conventional small group teaching	1 (2.1%)	0	0	22 (46.8%)	24 (51.1%)
Skill-based teaching helped me to develop better communication skills as compared to conventional small group teaching	0	1 (2.1%)	3 (6.4%)	18 (38.3%)	25 (53.2%)
I can see the relevance of skill-based teaching in the teaching curriculum	1 (2.1%)	1 (2.1%)	1 (2.1%)	18 (38.3%)	26 (55.3%)
Skill-based teaching provided better feedback (structured) about my learnings of this module as compared to conventional small group teaching	0	0	3 (6.4%)	18 (38.3%)	26 (55.3%)

[Table/Fig-3]: Perception of students towards skill-based teaching (n=47). 47 students filled the form; Results presented as number (%)

better prepared them to demonstrate and communicate the DDS to patients compared to conventional small group teaching.

Additionally, 95.8% of the students agreed that they had better clarity about what was expected to be learned and how the module would be assessed with skill-based teaching.

All the faculty members also found skill-based teaching to be more interesting, interactive, and leading to better retention of learning by the students compared to conventional teaching [Table/Fig-4]. However, the faculty felt that skill-based teaching required extra effort and more time, as each student had to perform and practice the steps of the DDS on their own.

Parameters	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I found skill-based teaching method better as compared to conventional small group teaching for this module	0	0	0	0	4 (100%)
Skill-based teaching is more interactive as compared to conventional small group teaching	0	0	0	0	4 (100%)
It was easier for students to retain the learnings of this module with skill-based teaching as compared to conventional small group teaching	0	0	0	2 (50%)	2 (50%)
I found skill-based teaching to be more interesting than conventional small group teaching	0	0	0	0	4 (100%)
Remarks	Skill-based teaching is more interesting and helps in retaining the topic for long duration, but it takes a little bit more time as compared to traditional teaching. Skill-based teaching enhances all domains of learning. In skill-based teaching, student learns the topic by performing themselves. It allows better interaction between student and teacher; provides immediate feedback to the student. Skill-based teaching is an effective method to make students competent. They learn by doing themselves				

[Table/Fig-4]: Perception of faculty towards skill-based teaching. Results presented as number (%)

DISCUSSION

The present study highlighted the importance of both interactive lectures for large group teaching and skill-based teaching in small groups. The results showed a significant increase in the knowledge scores of all the students from the pretest to the post-test questionnaire. This indicates that interactive large group teaching was an effective way of imparting knowledge to the students, with active interaction between the faculty and students.

Interestingly, there was no significant difference observed in the step-by-step demonstration of the insulin pen (skill) between the two groups. There could be several reasons for this. Firstly, the lecture included videos that depicted each step of using the insulin pen, providing visual guidance to the students. Secondly, the drug delivery devices were shown during the interactive large group teaching, allowing the students to have a hands-on experience. Finally, the assessment of the skill in using the insulin pen was conducted on the same day as the interactive large group teaching, which allowed the conventional teaching group to recall and apply the learnings from the interactive session. This suggests that the use of videos and asking specific questions during large group teaching can improve the retention of learnings among students.

Liang K et al., evaluated the role of simulation devices for insulin injection training and found a significant improvement in insulin injection technique [24]. Bhide A et al., compared the effectiveness of two small group teaching methods - tutorial and seminar - as supplements to didactic lectures in 1st year MBBS students. They did not find a

statistically significant difference in scores between the tutorial and seminar groups. However, students expressed positive feedback for small group teaching [10]. Singaravelu V and Madhusudhan U, assessed the effectiveness of the Jigsaw teaching technique with the small group teaching method among Phase III MBBS students. Their results showed a statistically significant improvement in students' scores with the Jigsaw technique [11]. In the present study, skill-based teaching showed similar or better scores compared to conventional small group teaching methods. These results highlight the need to choose the right small group teaching method for different topics to ensure optimal student involvement and performance.

Mehrabbeik A et al., investigated the association between insulin injection technique and blood glucose control in patients with Type 2 diabetes mellitus. They found that improper insulin injection technique led to pain during injection, lipohypertrophy, hyperglycaemia, and increased HbA1c levels [25]. Gorska-Ciebiada M et al., elucidated the impact of education on insulin injection techniques, treatment satisfaction, and glycaemic control among patients with type 2 diabetes [26]. Their study showed that professional education can result in the improvement of insulin injection technique, higher patient satisfaction, and better glycaemic control. Thus, skill-based teaching for medical students can potentially improve health outcomes in patients.

In the present study, communication skills were taught to the skill-based teaching group. There was a significant difference in the communication aspect between the two groups, with the skill-based teaching group performing better than the conventional teaching group. It is important to note that communication-based competencies (pH 5.1 to 5.7) [27] were already taught during the previous semester. This finding confirms that reinforcing the learnings of communication improves students' performance in the skill-based teaching group [28].

A significant difference was observed in the step-by-step demonstration of the MDI (skill) between the two groups, with the skill-based teaching group performing better than the conventional teaching group. This difference highlights the importance of skill-based teaching in better recall of the learnings from the lecture. As the skill-based teaching group was allowed to practice the step-by-step use of MDI, their performance was significantly better than the conventional teaching group. Jolly GP et al., reported a significant improvement in inhaler inhalation technique in patients who underwent systematic training for the use of MDI [29]. They also observed that demonstrating the steps in front of the patient led to better retention compared to written or verbal advice [29]. Kakkanattu TJ et al., assessed the impact of demonstrating the correct technique of using MDI using a standardised checklist [30]. They found that this educational intervention helped in patient education and reduced errors in the use of MDI. In another study, Kim JS et al., showed that many Chronic Obstructive Pulmonary Disease (COPD) patients used pressurised MDI (pMDI) incorrectly, and one-on-one coaching helped in improving the technique among these patients [31]. These findings support the role of skill-based teaching for medical students, starting from MBBS, to improve health outcomes in patients.

No difference was observed in the communication aspect of MDI between the two groups. This was expected, as the conventional teaching group had already been taught about communication in the previous session (same week), and the basic principles of communication with patients remain the same with minor differences in different scenarios. These findings suggest that skill-based teaching led to better recall and retention of the learnings from the large group teaching. Additionally, the use of videos, asking relevant questions related to the topic, highlighting key points, and repeating important points in large group teaching improved the learning of the students [32].

An important aspect of skill-based teaching is structured feedback about the students' learning. This feedback provides immediate validation of their performance, which may contribute to better results and perception. In a study conducted by Imran SS et al., researchers evaluated the perception of medical students regarding their skill lab training. The students believed that skill lab training was helpful for them, and practicing skills with mannequins better prepared them for working with patients [33]. These findings were similar to the present study, where students felt that skill-based teaching led to a better understanding of the DDS (subject). They also felt more confident in demonstrating and communicating the DDS to patients compared to conventional small group teaching.

Shanmugam J et al., evaluated the faculty perspective from medical colleges across India towards Competency-Based Medical Education (CBME) curriculum. In their study, they highlighted the need for additional teachers and improving faculty preparedness through training to ensure that teachers can conduct small group teaching according to CBME requirements [34]. Selva P and Rithkaa M, assessed student and faculty perspectives on the new MBBS curriculum. They also emphasised the need for sensitisation programs for faculty to improve the outcomes of competency-based medical education [22]. In the present study, faculty members felt that skill-based teaching was interactive and interesting but required more effort and time compared to conventional small group teaching.

Limitation(s)

There were certain limitations in present study. First, the present study did not calculate the appropriate sample size. The study was conducted on phase II MBBS students, where the number of students was fixed. Secondly, small group teaching and the assessment of skill and training for insulin pen were done on the same day as the interactive large group teaching. This could have resulted in similar performance of both groups regarding the skill of using the insulin pen, as there was better retention of learnings from the interactive large group teaching. Third, students did not actually administer the device in patients. They demonstrated the steps of using the device and communication in front of simulated patients.

CONCLUSION(S)

The present study has shown that active involvement and interaction of students with the faculty are key factors in better learning of the topic. Skill-based teaching encourages student involvement and interaction with the faculty compared to conventional teaching methods, resulting in similar or better performance in terms of skill and communication of DDS, as depicted by the study's results. Nonetheless, interactive large group teaching will continue to play an important role in imparting knowledge to students. Reinforcing skills and communication by combining them with appropriate competencies in subsequent MBBS phases will play a crucial role in improving student performance with simulated patients and making them competent when working with real patients.

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ANNEXURE 1

Questionnaire Insulin Pen

- By which route of administration does the insulin pen delivers the drug?
 - Intra-muscular
 - Intravenous
 - Subcutaneous
 - Intradermal
- Which is the most common site for administration of insulin by insulin pen?
 - Thigh
 - Abdomen
 - Arm
 - Back
- If the insulin in the insulin pen is cloudy, patient should
 - Shake the pen
 - Roll the pen
 - Discard the insulin
 - Keep the pen at room temperature for 30 minutes
- Insulin pen is injected at an angle of
 - 15 degrees
 - 30 degrees
 - 45 degrees
 - 90 degrees
- Lipodystrophy can be prevented by which of the following method?
 - Site rotation
 - Using different sites everyday
 - Using insulin pen on alternate days
 - Massaging the site after injection
- Insulin pen should be stored at a temperature of
 - Below 0°C
 - 2-8°C
 - 25-30°C
 - Room temperature

7. How many units of insulin does the insulin cartridge has?
 - a. 100
 - b. 200
 - c. 300
 - d. 400
8. What is the maximum number of units of insulin that can be delivered by an insulin pen in one injection?
 - a. 20
 - b. 40
 - c. 60
 - d. 80
9. Insulin injections are must for all of the following condition except?
 - a. Type 1 Diabetes mellitus
 - b. Type 2 Diabetes mellitus
 - c. Gestational Diabetes mellitus
 - d. Diabetic ketoacidosis
10. If the insulin in the insulin pen is lumpy and discoloured, patient should
 - a. Shake the pen
 - b. Roll the pen
 - c. Discard the insulin
 - d. Keep the pen at room temperature for 30 minutes
11. How long should the patient hold the insulin pen at the site of injection after injecting insulin before withdrawing needle?
 - a. 1-2 seconds
 - b. 3-4 seconds
 - c. 5-10 seconds
 - d. No need of holding
12. All are true about priming of the insulin pen except
 - a. Removes air bubbles from the needle
 - b. Should be done when using pen after long time
 - c. Ensure that the needle is open and working
 - d. 1-2 unit of insulin should be used for priming
13. Which of the following is correct with regards to the needle used for insulin injection?
 - a. Should be replaced with every injection
 - b. Should be replaced after 3-4 days
 - c. Should be wiped with alcohol swab before injection
 - d. Should be replaced only after injection becomes painful
14. How will you ensure that the patient understood the right way of using insulin pen?
 - a. Ask the patient if they have understood
 - b. Ask the attendant if they have understood
 - c. Ask the patient to perform the first injection in front of you.
 - d. Ask the patient to watch videos of insulin injection technique online
15. All of the following are important points that should be communicated to patient to prevent hypoglycaemia except
 - a. Insulin should be taken just after the meals
 - b. Symptoms of hypoglycaemia include sleepiness, shaking, sweating, dizziness and hunger
 - c. Patient should immediately eat glucose or biscuit to raise their blood glucose level
 - d. Insulin should be stopped for 2-3 days after an incidence of hypoglycaemia

ANNEXURE 2

Questionnaire Metered Dose Inhaler (MDI)

1. By which route of administration does a Metered Dose Inhaler (MDI) delivers the drug.
 - a. Oral
 - b. Nasal
 - c. Inhalational
 - d. Sublingual
2. After you have used the number of puffs printed on the MDI, you should
 - a. Discard the canister
 - b. Continue to use it if it continues to spray
 - c. Refill the canister
 - d. Switch to oral tablet
3. All are true about Priming of the device except
 - a. Should be done for the first time
 - b. Should be done every time you are using it
 - c. Ensures that the device is ready to use
 - d. Should be done if you are using it after a long time
4. All of the following drugs can be administered by a MDI except
 - a. Corticosteroids
 - b. Beta-2 agonist
 - c. Mast cell stabiliser
 - d. Leukotriene receptor antagonist
5. What is the minimum age in which MDI can be used
 - a. 2 years
 - b. 3 years
 - c. 4 years
 - d. 5 years
6. MDI can be used in all of the following conditions except
 - a. Acute attack of Bronchial asthma
 - b. COPD
 - c. Prophylaxis of asthma
 - d. Status asthmaticus
7. Which of the following is not an advantage with MDI
 - a. Rapid absorption due to large surface area
 - b. Targeted higher concentration of drug delivery
 - c. Rapid onset of action
 - d. Use with specific technique
8. All of the following symptoms may suggest an overdose of salbutamol and must be communicated to the patient except
 - a. Palpitations
 - b. Salivation
 - c. Headache
 - d. Muscle tremors
9. All of the following are important instructions for use and storage of MDI inhaler except
 - a. Store at room temperature, away from heat and direct light.
 - b. Do not freeze.
 - c. Throw empty canister in fire to prevent its misuse
 - d. Do not exceed the recommended dose even if you have breathing problems
10. Which of the following is not an advantage of using spacer with MDI
 - a. No need of breath synchronisation
 - b. Easy to use specially for children

- c. Portable
 - d. Decreased drug wastage
11. All of the following are important steps while using MDI except
 - a. Shake the inhaler well before use
 - b. Exhale completely
 - c. Place the mouthpiece between lips fully into the mouth
 - d. Tilt the head forward and press the inhaler while inhaling slowly and deeply
 12. What is the recommended time duration to hold your breath after taking a puff from MDI
 - a. 5 seconds
 - b. 10 seconds
 - c. 15 seconds
 - d. 20 seconds
 13. All of the following are important steps for a doctor while communicating with the patient except
 - a. Introduces yourself and greet the patient
 - b. Speaks in a simple way and in a language the patient can understand
 - c. Ensure that the patient listens to you without interrupting
 - d. Explains the disease and drug to be used for the treatment
 14. All are true about cleaning of the MDI except
 - a. Must be done after every use
 - b. Plastic holder should be removed and cleaned with water
 - c. Ensures that the device does not get blocked
 15. Gargling after using MDI is important for which of the following drugs
 - a. Corticosteroids
 - b. Beta-2 agonist
 - c. Mast cell stabiliser
 - d. Anticholinergics

ANNEXURE 3

Steps of using Insulin Pen [14,15]

S. No.	Steps	Marks
1	Wash your hands with soap and water. Remove the cap of the insulin pen	1
2	If the insulin in the pen appears cloudy, roll the pen in your hands and turn it from side to side for one full minute. Do not shake the pen	1
3	Wipe the rubber stopper of insulin pen. Attach a new pen needle onto the insulin pen. Do not let the needle touch anything	1
4	Prime the insulin pen by turning the dose knob to 2 units indicator and press the knob. Priming means removing air bubbles from the needle, and ensures that the needle is open and working. The pen must be primed before each injection	1
5	Select the dose of insulin that has been prescribed for you by turning the dosage knob	1
6	Select and clean the injection site. The abdomen is the preferred place for insulin injection, between the bottom of the ribs and pubic line, avoiding 3-4 inches surrounding the navel. The middle 1/3 rd of the outer thighs and middle 1/3 rd of back of upper arms may also be used	1
7	Using your dominant hand, wrap your fingers around the insulin pen, keeping your thumb free to push down on the knob. Insert the needle with a quick motion into the skin at a 90-degree angle. The needle should go all the way into your skin	1
8	Slowly push the knob of the pen all the way in to deliver your full dose. Hold the pen at the site for 5-10 seconds, and then pull the needle out	1
9	Carefully place the outer cap on the needle, unscrew the needle (the needle should come off with the outer cap) and drop into your container for used "sharps" equipment	1
10	Replace the pen cap and store it at room temperature or refrigerator (do not freeze)	1

ANNEXURE 4

Steps of using Metered Dose Inhaler (MDI) [16,17]

S. No.	Steps	Marks
1	Wash your hands with soap and water	1
2	Remove the cap from the Metered dose inhaler (MDI). Shake the inhaler vigorously for 5 seconds	1
3	Prime the inhaler by releasing one puff in air if using inhaler for first time or after a long time (>7 days)	1
4	Breathe out all the way through the mouth	1
5	Hold the inhaler in upright position and place the mouthpiece fully into mouth between lips	1
6	Tilt the head backward and press the inhaler once while inhaling slowly and deeply with your mouth	1
7	Hold your breath for 10 seconds to allow the medication to reach the airways of the lung	1
8	Repeat the steps 3-7 for each puff. Wait about 1 minute in between puffs	1
9	Replace the cap on your MDI when finished	1
10	If you are using a corticosteroid MDI, rinse your mouth and gargle using water or mouthwash after each use	1

ANNEXURE 5

Communication Checklist for using Insulin Pen/Metered Dose Inhaler [18]

S. No.	Points	Marks
1	Introduces him/herself and greets the patient	1
2	Speaks softly and slowly	1
3	Speaks in a simple way and in a language that she can understand	1
4	Listens to patient, encourage patient involvement in communication	1
5	Drug name, dosage, route of administration and importance of drug adherence explained	1
6	Explain the technique of using the device (insulin pen/Metered Dose Inhaler)	1
7	Explained the adverse effects of the drug	1
8	Explained that the drug and device should be stored in a cool and dry place away from sunlight	1
9	Encourages patient to demonstrate the technique in front of you and speak back what all he has understood regarding the medication	1
10	Summarises main points, address any doubts and plan next visit	1