CHAPTER 3

The Present Study
THE PRESENT STUDY

Introduction

Pharmacology is one of the most important subject learnt by nurses in their second year B.Sc. nursing programme. Having good understanding of pharmacology makes a student nurse competent in administering medication to her or his patient with ease and perfection. Medication administration is an activity that is prone to errors. In part because of the proliferation of new devices and new drug products. On the other hand drugs are administered in different routes, dosages, dosage forms, and dosing regimens, adding intricacy and variability. Moreover medication orders are changed frequently, as medical specialist provide input into patient care based on changes in patient clinical status and results of diagnostic test.

A lot of research has also gone into the ascertainment of the effects of miscalculation of drug dosages. While in some quarters a miscalculation of drugs is not attributed to any serious drug administration error cases, Anema et.al argues that the calculation of medications is paramount to the enhancement of safety as far as the administration of medicines is concerned. However, it is important to note that when it comes to medication calculation, specific problems have been identified. These problems can be attributed to a wide range of factors which include but are not in any way limited to the students’ inabilities to integrate their basic mathematical skills into the real work situation.
All in all, nursing students should not jeopardize the well being of their patients by amongst other things failing to use superior judgment as far as the administration of medicines is concerned. While the role of educators when it comes to training as well as preparing nursing students can have a big impact on reducing as well as decreasing instances of drug administration errors.

As suggested by the reviews and investigators experience in dealing with the students, nursing students’ teaching learning approaches towards pharmacology subject need to focus on varied methods to suit their learning styles and also longer retention. Most of the teaching learning impact is tested on the medical students with its origin in foreign countries and some in India. Today, the challenges faced by a student nurse are not only studying pharmacology but also communication skills as the patients come from different regions with different languages. Hence this poses a challenge to the students to great extent. Therefore nurse educators’ role widens to preparing nurses well equipped with therapeutic communication skills. Considering these aspects the present study was undertaken at the Manipal College of Nursing, Manipal University, Manipal, India. The study concentrates on only one unit of the subjects pharmacology - “Respiratory drugs”.

The objectives of the study
1. To develop two teaching learning modules - Active lecture cum live demonstration and Active lecture cum video demonstration.
2. To compare the outcome of two teaching learning modules in terms of UG students’ competency in drug administration in terms of
Chapter 3

The Present Study

- UG nursing students’ clinical competency in drug administration
- Patients’ understanding/ communication of the usage of the prescribed drugs

3. To determine the influence of students’ competence in drug administration on the patients’ understanding to drug therapy.

4. To obtain UG nursing students’ opinion on the Active Lecture cum live demonstration and active lecture cum video demonstration form of learning.

5. To correlate between the students’ competence in drug administration and their performance in pharmacology in the second year university examination.

Assumptions

1. The knowledge of pharmacology is essential for nursing practice
2. All approaches of teaching pharmacology aims to develop students’ competence in drug administration
3. The ‘Nursing Process’ approach of nursing care ensures comprehensive / holistic health care.
4. Interactive teaching - learning methods help to develop students’ abilities for critical thinking, clinical reasoning and making therapeutic decisions.

Operational definitions

Active lecture: Active lecture refers to organizing all the learning components in a meaningfully interrelated pattern, so that learning is wholesome and comprehensive.
Competency: Competency refers to the students’ knowledge regarding respiratory drugs, administration of the prescribed drugs, principles of drug administration, calculations and the medications being administered to the patients as measured by structured questionnaire, skill check list, attitude rating scale (Opinionnaire), and their ability to administer medication safely and effectively as per the institutional policy and procedures as measured by competency checklists.

Teaching learning approaches: In this study teaching learning approaches refers to the Active lecture cum live demonstration (ALLD) and Active Lecture cum Video form of demonstration (ALV) which are systematically designed for second year nursing students to provide Knowledge of pharmacology and skill in oral medication, Nebulization, Meter Dose Inhaler (MDI) and use of Mini Peak Flow Meter. The two teaching learning approaches include two components; knowledge and skills. Knowledge component includes the following which are common to both the groups:

- Introduction to pharmacology
- Respiratory drugs
- General principles and calculation of medications for administration
- General guidelines for medication administration
- Nursing process application to drug administration
- Medication errors
- Responsibilities of the nurse

Skill components include demonstration of selected skills on:

- Oral medication
The Present Study

- Nebulization
- Metered Dose Inhaler (MDI)
- Mini Peak Flow Meter practice.

The methods of training included a combination of lecture cum live demonstration, small group discussion, quiz, power point presentation and demonstration of selected skills for the control group. For the experimental group the teaching method includes Lecture Cum Video Demonstration (ALV), small group discussion, quiz, power point presentation and demonstration of selected skills with one return demonstration by the students under supervision on 90th day after the sessions and demonstrations by both groups.

Knowledge: in this study knowledge refers to the correct responses by the students as measured by a structured knowledge questionnaire on respiratory medications, principles of medication, medication errors, oral medication administration, Nebulization, MDI and use of Mini Peak Flow Meter.

Skills: It refers to the ability of the nursing students to administer oral drug administration, Nebulization, MDI and practice of Mini Peak Flow Meter as measured by a competency checklist. The checklist consist of two components i.e. knowledge and observation. Knowledge consist of the 7 rights of medication administration and the action mechanism, dosage, indications, contraindication, side effects or adverse effects, drug interactions and nurses responsibilities.
Problem solving approach: Problem solving approach in this study refers to student’s attainment of skills such as cognitive, interpersonal and technical in drug administration.

- Cognitive or intellectual skills, such as analyzing the patient’s health problem and drugs prescribed for him by the physician. These skills are the ability to identify, differentiate actual and potential health problems through observation of signs and symptoms and also the laboratory values and taking the decision by synthesizing nursing knowledge learned.

- Interpersonal skills, in this study includes therapeutic communication, active listening, conveying knowledge and information that are in a way understood by the patients regarding their drugs.

- Technical skills, in this study refers to the knowledge and skills needed to properly and safely manipulate and handle appropriate equipment or articles needed for the patient in performing drug administration such as nebulizer, MDI and oral medication administration.

Outcome: In this study outcome refers to the students’ post test score in Knowledge questionnaire and practice checklists.

UG nursing students: It refers to the undergraduate nursing students who are undergoing II year BSc. Nursing courses in selected setting.

Comparative analysis: It is a statistical analysis of the outcome of the two teaching-learning approaches and comparing the outcome by applying analysis of covariance.
Medication administration: It refers to safe administration of selected oral and aerosol (mist form of liquid medication) medications intended for use in cure, treatment, or prevention of disease in respect to selected respiratory disorders following the rights of patient- right patient, right drug, right dose, right route, right time, right to refuse, right to be educated and right documentation.

Medication error: Administration of any forms of drugs by any health care professional which cause any form of harm or damage to the health of the recipient.

Patient’s understanding of drugs: In this study patient’s understanding of drugs refers to the patient’s decision to regularly use the drugs prescribed for the specific health problem, by a registered health professional.

Multi-media: In this study multi-media refer to the materials used for teaching learning that includes text, animation, video and interactivity during drug administration.

Conceptual framework

The conceptual model deals with the abstractions assembled by virtue of their relevance to a common theme.\(^18\) The theoretical framework for a particular study is made up of the concepts and relational statements between the concepts to be examined or tested.\(^19\) The model gives directions for planning research, data collection and interpretation of findings.

The conceptual framework of this study is based on the conceptual model given by Bernard Blandin.\(^68\) It is used to assess the relevance of learner information
data models in the field of information technologies for learning, education and training and is used as a basis to assemble data models which are proposed to standardization of work as well. It intends to provide a map of concepts which are described by terms which are used in learning, education and training such as ability, activity, aptitude, competence, educational objectives, knowledge, performance, qualification, skill and task. It further explains the relationship between the terms defined and presents the domains in which the terms are preferably used with definition which are provided. The concepts of model are defined below:

- **Ability** is a set of natural or acquired disposition in which a person is proficient. Ability can be demonstrated in a professional, or vocational or indirectly measured by a test. In this study ability means the acquired proficiency of the students in drug administration. Abilities of students are usually expressed in terms of sets of various pieces of knowledge and knowhow of drug administration.

- **Know - how** is the practical knowledge. This is considered as “tacit knowledge”, which means that it cannot be explained by words, or formalized. In this study it refers to the practical knowledge the students have in relation to drug administration in a structured environment which includes- oral drug administration, Nebulization, MDI and practice of Mini Peak Flow Meter.

- **Competence** is the ability to solve a problem in a given context, i.e. a contextualized ability. It corresponds to implementation of knowledge. Know-how, skills, behaviors, procedures and way of reasoning to perform an activity. It corresponds to the implementation of a given behavior to perform an activity...
in a given situation. Competence is therefore considered as the reactive meeting of a person's actual and potential abilities and the situation in which they are mobilized and demonstrated. By extension, "professional competence" means the demonstrated ability to perform adequately a given work activity. In this study it means the procedural and practical knowledge of medication administration, skill of students in administering medications through oral, Nebulization, MDI and the practice of Mini Peak Flow Meter to note their changes in the lung capacity for medical help, critical thinking or reasoning of the students on medications being prescribed for the patient. 68

**Educational objectives:** The aim of a learning activity is expressed in terms of expected behavior. In this study the investigator as service provider expresses in terms of knowledge and know-how of the student through educational objectives stated in the teaching learning materials. It includes acquisition of knowledge regarding respiratory drugs, oral medication administration, the principles, calculations, medications being administered to the patient and knows –how of what to teach the patient in respect to his or her medications received. Educational objectives stated included strengthening the skills of students on selected procedures such as oral drug administration, Nebulization, MDI and also peak flow meter which is very essential for asthmatic patients to understand their status so as to take right decision for medical assistance.
Performance: Performance is the result of an action performed in a structured given situation. Performance demonstrates the competence used for the action. It is measured in terms of activities successfully achieved. Here it refers to the oral medication administration skills, Nebulization, MDI and use of Peak Flow Meter skills fulfilling the criteria set.

The conceptual model describes the activities carried out in a structured laboratory in an educational set up.

Actions of an individual are like soil in which behaviors are built, and from which they are fed and improved. Behavior patterns are composed of sets of abilities, mixing various types of knowledge and know-how in behavioral rules adapted at a given context of action. In the present study, the action of the student is medication administration to a standardized client mimicking the actual daily practice in the clinical care areas as part of their experience. Here behavior of the student refers to the competency of the nursing students in administering medication as well as performing procedures like Nebulization, MDI and also practice of peak flow meter. In a given situation, the instantiation of a behavioral pattern and its adaptation to the situation demonstrates the abilities of the person, and shows the evidence of his or her competence. The 2nd year nursing students show certain amount of ability in administering medication in everyday work as a nurse in the hospital set up, which is based on the acquired knowledge from the basic nursing education, knowledge gained from past one year experience, which demonstrates the ability of the student. This ability reveals his or her competency. The implementation of a behavioral
pattern in a given course of action results in a certain level of performance which occurs in the work setting. When a student nurse continues to administer medications as his or her part of assignment of patient care, it results in his or her level of performance.

Life in society makes the construction of some behavioral patterns desirable. To facilitate the construction of such patterns is the role of education through repeated reinforcement of their learning to minimize errors in medication. The investigator aims at providing two teaching learning methods to enhance their knowledge and skills and to find which approach suits the present students in attaining their competency. The targeted aptitude was set as the ability to administer oral medication, Nebulization, MDI and peak flow meter and the expected level of performance was set as meeting the criteria listed in the competency checklist.

All the concepts are interrelated and the performance of the student nurse in the working context depends on his or her knowledge, attitude, various acquired experiences and adherence to the organizational policies and procedures. Achievement of the acceptable standards of medication administration depends on the educational objectives, performance and the competence of the student nurse. All these factors contribute to the actions that the student nurse carry out in medication administration. These actions in turn influence the behavior that is competency in drug administration is based on the acceptable standards. The interrelated concepts is given in figure: 1
Fig 1: Conceptual framework on competency of 2nd year B.Sc. nursing students in relation to learning pharmacology and drug administration based on Bernard Blandin model
Variables

*Independent variable:* In this study the independent variable is the two teaching learning approaches active lecture cum live demonstration (ALLD) and active lecture cum video demonstration (ALV).

*Dependent variables:* In this study the dependent variable are knowledge, opinion/attitude and competency scores in the post test.

*Covariate or concomitant variable:* In this study the covariate is the knowledge, opinion/attitude and competency scores in the pre test.

*Extraneous variables:* Extraneous variables in this study are age, gender, parental education, parental occupation, pre university education, medium of instruction, percentage of marks secured in PUC, and percentage of marks secured in Anatomy and Physiology, Biochemistry, Microbiology and Fundamentals of nursing.

Hypotheses

All hypotheses were tested at 5% level of significance

1. There will be a significant difference between the outcome of two teaching learning approaches in terms of:
   - UG nursing students’ clinical competency scores in drug administration
   - Patients level of understanding of the usage of the prescribed drugs for them

2. There will be a significant association between the students’ competence in drug administration and marks in pharmacology in the University examination.
Chapter 3

The Present Study

Delimitation

The study is delimited to the student nurses studying in second year B.Sc. nursing programme

This chapter describes the methodology adopted for the study which includes research approach, design, setting, sample and sampling technique, development and description of the instruments for data collection, development of the structured teaching plan using ALLD /ALV for teaching pharmacology to UG nursing students, data collection process, and plan for data analysis. Therefore methodology of research organizes all the components of the study in a way that is, most likely to lead to a valid answer to the research questions. The present study aims to determine the effectiveness of two teaching learning methods to teach pharmacology and also drug administration among the second year B.Sc. nursing students in Karnataka.

Research Approach

The investigator adopted an evaluative approach as it aimed to compare two teaching learning approaches in teaching and learning pharmacology. Evaluative research is an applied form of research that involves finding out how well a specific program, practice, procedure or policy is working. The classic evaluation model stresses on the importance of developing behavioral objectives which is an intended programme outcome stated in terms of behavior of the students at whom the programme is aimed at. The present study is evaluative in nature as it determines how well the programme contributes in preparing student nurses to perform
medication administration competently with complete understanding of the subject pharmacology.

**Materials and Method**

*Data collection tools and techniques*

The instrument selected for a research should be as far as possible a vehicle that would best obtain for drawing conclusions that are pertinent to the study\(^6\). The purpose of this study was to compare the outcome of two teaching learning methods in respiratory drugs, a unit of pharmacology. The teaching learning outcome focused on knowledge of respiratory system drugs and the skills in drug administration so as to provide error free nursing task. In order to obtain their correct responses, 60 multiple choice questions related to respiratory unit drugs and also skill checklist on oral drug administration, Nebulization, MDI and use of peak flow meter were considered appropriate tool for the study as it measures the knowledge and skills of the nursing students in administering medication procedures as well as use of certain devices to make patient aware of their symptom severity and follow up.

In order to get the difference of opinion of the two teaching learning approaches, the researcher considered the rating scale as an appropriate tool. A rating scale with 20 statements were prepared to collect data from the students and another 20 statement related to Nurse’s communication on patients’ basic rights and Patient’s understanding of the drugs prescribed for them were also developed in order to obtain data on their opinions so as to what makes them learn better and also client’s opinion on the students’ performance in communicating the desired outcome.
Hence the following instruments were constructed and were used to obtain the necessary data.

Tool 1 : Student’s Personal Profile

Tool 2 : Knowledge questionnaire on respiratory system drugs and drug administration (60 items)

Tool 3 : Competency checklist on oral drug administration (19 items)

Tool 4 : Competency checklist on MDI (14 items)

Tool 5 : Competency checklist on Nebulization (29 items)

Tool 6 : Competency checklist for Mini Peak Flow Meter use (10 items)

Tool 7 : Nurse’s communication on patients’ basic rights and Patient’s understanding of the drugs prescribed. (19 items)

Tool 8 : Students’ opinion on the teaching - learning methods for learning pharmacology (20 items)

**Development of the tools**

**Development of students’ personal profile**

Student’s personal profile includes age, gender, parental education, parental occupation, pre university education, medium of instruction, percentage of marks secured in PUC, and percentage of marks secured in Anatomy & Physiology, Biochemistry, Microbiology and Fundamentals of nursing (Appendix I).
**Development of knowledge questionnaire consisting of 60 MCQs.**

This questionnaire includes 60 MCQs on respiratory system drugs, item structured knowledge questionnaire on respiratory system drug including introduction to pharmacology, principles of medication administration, nursing process on medication administration, its calculation methods, drug mechanism, drug interaction, drug errors and nurses’ prime responsibilities in regard to drug administration. The items were prepared based on the review of literature, analysis of the sessional exam results, and expressed difficulty revealed through a survey among 60 second year B.Sc. nursing students. Correct response scored ‘1’ mark and wrong response scored ‘0’ mark. Blue print was prepared keeping in mind the three domains that is knowledge, comprehension and application. There were 28 items (46.67%) on knowledge domain, 22 items (36.67%) on comprehension domain and 10 items (16.67%) on application domain. (Appendix K)

**Content validity**

Content validity is defined as the degree to which an instrument measures what it is intended to measure. Content validity of the structured knowledge questionnaire and students’ profile was established by submitting it along with the objectives and blue print to 5 experts from the field of general medicine, respiratory medicine and nursing. The experts were selected based on their expertise and clinical experience. They were requested to give their opinion on appropriateness, accuracy and relevance of the items in the tool. There was 100 % agreement for all items for tool 1 (students’ profile). The Knowledge questionnaire had 60 items of
which one of the item had wrong response (item number 8) and hence it was rectified. Others had 100% agreement. One expert opined that figure on the MDI question (item number 43) to be included and it was evident in the final tool.

**Pre-testing of the tools**

The tool 1 and 2 on demographic data and knowledge questionnaire were administered to forty 2\textsuperscript{nd} year B.Sc. Nursing students of Sreedevi College of Nursing during 2008. The time taken by the students to answer the questionnaire varied from 45 minutes to one hour.

**Reliability**

The reliability of an instrument is the degree of consistency in which it measures the attribute it is supposed to be measuring.\textsuperscript{21} Reliability of tool 2 was established by using Split half method and Spearman Brown prophecy formula. The reliability of the tool was $r = .75$.

**Development of Competency checklist on oral medication, Nebulization, Metered Dose Inhaler (MDI) and practice of Mini Peak Flow Meter**

Based on the institutional policy and also standard procedure protocols learnt in fundamentals of Nursing, the competency checklist was prepared to assess the competency of nursing students on oral drug administration, Nebulization and MDI and the practice of Peak flow meter. Each correct response scored ‘1’ mark and wrong response scored ‘0’ mark. Literature related to drug administration, its errors and nurses’ responsibilities were retrieved from the journals, books and internet and
steps in performing the procedures were defined in terms of measurable and observable tasks.

Oral medication observation checklist:

Tool had 26 items initially. The items covered in this checklist were washes hands, collects necessary equipments, checks medication record against doctor’s prescription, checks patient’s medication allergies, interprets all abbreviations correctly, takes right drug from the locker, checks medication label against form or medication card, dispenses correct amount (and calculates the dose if required), re-checks label with medication form (2<sup>nd</sup> time) and replaces the drug in the locker/drawer, takes medication and file to patient’s bed side and asks patient to identify him or herself, checks patient’s identification with the hospital file, counter checks the medication with another nurse, explains to the patient regarding name of the drug, action mechanism of the drug, dosage, indication and interaction, possible side effects, special instructions, assists patient to swallow medication, puts patient to safe and comfortable position, returns and disposes equipments appropriately and records medication accurately in the nurses’ record. Repetition was identified by one of the validator and hence the repeated item was removed and the final tool had 25 items. The 25<sup>th</sup> item is a subjective item to assess if any comments the patient has during the procedure and also interaction which was not included for scoring. So the maximum score for this tool was 24 (Appendix L).
Observation checklist on Nebulization:

This tool had 29 items. The areas covered in this checklist were - explains the purpose of Nebulization, explains to the patient the type of drug used for him or her for Nebulization, checks the timing and the medication to be used, explains the procedure to the patient, auscultates the lung for the adventitious breath sounds, provide a propped up position if not contraindicated. The student assembles the following that is solution for Nebulization, nebulizer with the Nebulization kit, cotton/gauze pieces (to clean the mask), sputum cup, and towel and checks the working condition of the equipments. During the preparation phase, the student closes the chamber and make it tight, attaches the chamber to the mask, puts on the switch and sees for the misting of the drug, applies mask to the patient, explains to the patient to breathe deeply and monitors the patient continuously till the medication is over. During the procedure, the student plugs the equipment to the electric supply, opens the chamber and pour the solution as directed, closes the chamber and make it tight, attaches the chamber to the mask, puts on the switch and sees for the misting of the drug, applies mask to the patient, explains to the patient to breathe deeply, and monitors the patient continuously till the medication is over. Once the procedure was over, the student removes the mask, wipes the face of the patient, makes the patient to remain in the bed for 10 minutes and places the patient in comfortable position. Records date and time and duration of medication, records type and amount of medication given, checks breath sounds after the procedure, and replaces the articles after the procedure. The total maximum score was 29 (Appendix M).
Metered Dose Inhaler (MDI):

This tool had 14 items i.e. the student checks the physician’s prescription for dosage and time, explains the purpose of the medication (bronchodilators relaxes bronchial smooth muscle and increases diameter of nasal passages making breathing easy and respiratory functions improves), collects required articles at bedside, explains the procedure to the patient, shakes the inhaler well before use 3-4 times, shakes the inhaler after removing the cap, explains to the patient to breathe out for 1 or 2 seconds away from the inhaler, explains to the patient to bring the inhaler to the mouth and place it in the mouth between teeth and close the mouth around it and start to breathe in slowly, like sipping hot soup. The patient is instructed to press the top of the inhaler as he or she breathe in once and keep breathing in slowly until one has taken a full breath. The student instructs the patient to hold breath for 4 to 6 seconds and then breathe it out. Once the procedure is over she assists patient in rinsing his or her mouth, records the number of puffs taken, cleans the mouth piece with gauze and replaces the puffer in patient’s locker. The tool has a total maximum score of 14 (Appendix N).

Mini Peak Flow Meter Practice checklist:

This tool had 10 items with a score of 1 for right action and 0 for wrong action or not done. Items include gathering all equipments near patient site. Explains the purpose of the procedure to the patient, inserts the mouthpiece into the meter, ensures that the pointer is set at zero or till it does not move any further when she moves the pointer towards the mouth piece. She holds the Peak Flow Meter so that
the fingers are clear of the scale and slot. She makes sure that she does not obstruct the holes at the end of the Peak Flow Meter, and stands up if possible or sits on the chair. Participant takes a deep breath, places the Peak Flow Meter in the mouth and holds horizontally, closing the lips around the mouthpiece, then blows as hard and fast as she/he can. Participant understands that one should not put the tongue inside the mouth piece and if she happens to spit or cough into the mouth piece then repeats the reading again. She/he looks at the scale and notes the number on the scale indicated by the pointer and the number is her or his reading. Marks or records the highest of the three readings on his or her Peak Flow diary and she/he replaces the peak flow meter. The tool had its total score of 10. The investigator was trained how to use the Mini Peak Flow Meter and Lung function test from department of Respiratory medicine, KH, Manipal (Appendix O).

Validity of the tools

To establish content validity, the observational checklist along with the criteria for validation was given to 5 experts. Competency checklist on oral medication, Nebulization, MDI and practice of peak flow meter was assessed by 5 experts from the field of General Medicine, respiratory medicine and nursing. Item 19 on the oral medication checklist (tool 3) expects the student nurse to report suspected complications to appropriate person that is to the in-charge or the physician. This item is an important step in the drug administration yet during the mock drug administration by the students the drugs are not swallowed by the patient and hence the complications that are expected will not appear. Hence for the learning view the item has been in place though they score 0 during its procedural steps as the
standardized patient does not take the medication. Item 9 (re-checking the label) and 13 (explaining the name of the drug, action mechanism of the drug, dosage, indication and interaction, possible side effects and special instructions) on tool 3 had 80% agreement. The two items were modified as they were very essential elements in the procedure with minor modification. Tool 4, 5, and 6 had 100% agreement.

Reliability

Inter rater reliability for the observation checklists were done by observing 20 second year B.Sc. nursing students of Ullal College of Nursing, Mangalore by 2 observers. The reliability co-efficient was calculated using Pearson’s Product moment correlation and was found to be 0.9, 0.95, 0.9 and 0.92 respectively.

Development of rating scale of Nurse’s communication on patients’ basic rights and patient’s understanding of the drugs prescribed and administered

It is a rating scale comprising of 19 items on the necessary information the nurse need to instruct the patient while giving medication in order to enhance their understanding and compliance status. Explanation can be either given completely, incomplete or not acceptable to the client. Hence the researcher used a rating scale from relevant review of literature and discussion to obtain the level of instruction given by the nurse during the oral medication administration as scored by the client to as ‘To great extent=3, Somewhat=2, Very little=1, Not at all=0’ (3, 2, 1 and 0 respectively). The maximum score is 60. (Appendix P).
Content Validity

Content validity was established by giving the tool to 5 experts in the field of General Medicine, Respiratory Medicine and Nursing. There was 100% agreement on all the items and all items were retained.

Reliability

The final rating scale on nurse’s communication on patients’ basic rights and patient’s understanding of the drugs prescribed were administered to 20 second year B.Sc. Nursing students of Ullal College of nursing, Mangalore using a three point rating scale. The time taken by each subject to respond to the rating scale on nurse’s communication related to the drugs prescribed to them varied from 6-10 min. Reliability of the tool was established by Cronbach’s alpha to determine the internal consistency and was found to be α= 0.84

Student’s opinion on video form of learning

The Opinionnaire in the form of rating scale consisting of 20 items on the teaching learning approaches used in the present study in learning pharmacology subject specifically relating to the respiratory drugs was constructed based on the review of literature and experts’ opinion. The statements of the rating scale scored as 3, 2, 1 and 0 for strongly agree, agree, disagree and strongly disagree respectively, with a maximum total score of 60 (Appendix Q).
Content validity

The final tool on students' opinion on the teaching learning methods in learning pharmacology presented in the form of rating scale i.e., strongly agree (3), agree (2), disagree (1) and (0) for strongly disagree respectively, had a total of 20 items. Item number 2, 3, 6, 7, 12, 13, and 14 had 80% agreement and the remaining items had 100% agreement. The suggestions given by the expert were to concise the sentences in these items and modifications were made respectively retaining all the items. All the experts agreed on coverage of the content and relevance of the items.

Reliability

The opinionnaire in the form of three point rating scale was administered to 20 second year B.Sc. nursing students. The time taken by each student was about 12-15 minutes. The reliability of the tool was established using Cronbach's alpha to determine the internal consistency and was found to be 0.9.

Training of the standardized patient

Standardized Patient (SP) is a lay person hired and trained to portray the role of actual patient, presenting a faculty defined clinical scenario with patient history and physical symptoms for teaching and assessment purpose. In the present study Mrs. Vijya and Mrs. Shambhalata who were working as supervisors in MU, with educational qualification of PUC Arts stream were selected to play the role of SP. They were trained by the physician and the investigator keeping in mind the drugs that are being prescribed which were written on the doctor's order and also the sample drugs and the procedure which the SPs will be witnessing including
description about the drug, its mechanism on the body, indications, and side effects and also what the nurse will observe in her while the selected drugs are given. The expected interaction of the nurse is also briefed with the tool # 7 on Nurse’s communication on patients’ basic rights and patient’s understanding of the drugs prescribed for them.

**Development of competency based teaching learning approaches on respiratory medications and principles of medication administration**

A competency based teaching learning (ALLV Vs ALLD) was developed for the second year B.Sc. nursing students for learning respiratory medications, a unit of the subject Pharmacology following the steps -

1. Preparation of the first draft of the pharmacology basics and respiratory drug content as per the B.Sc. Nursing, Indian Nursing Council (INC) syllabus.

2. Preparation of teaching aides-
   - Preparation of the procedural steps on oral medication administration, Nebulization, Metered Dose Inhaler (MDI) and Mini Peak Flow Meter practice.
   - Development of video on the nursing procedures

3. Establishment of content validity

4. Preparation of final draft (Appendix R).
Preparation of the final draft of teaching learning

First draft of the content was prepared based on the INC syllabus, review of literature and experts’ opinion. Teaching plan consisting of specific objectives, content, teaching learning activities and evaluation were made. The contents were prepared in a simple and comprehensive approach. The language, method of teaching, relevance of teaching aides and the attention span of the learners were kept in mind while preparing the draft. The competency based teaching learning was planned for 10 hours of active lecture (inclusive of small group discussion and quiz).

The areas include:

- Introduction to pharmacology
- General principles and calculation of medications for administration
- Respiratory drugs
- General guidelines for medication administration
- Nursing process application to drug administration
- Medication errors
- Responsibilities of the nurse

Skill components include demonstration of selected skills on:

- Oral medication
- Nebulization
- Metered Dose Inhaler (MDI)
- Mini Peak Flow Meter
Content validity of the teaching learning approaches

The final draft of the teaching learning materials along with the lesson plan, power point and the video (CD) were given to 5 experts from the field of Medicine and Nursing. They were requested to give their suggestions on accuracy, relevance and appropriateness of the competency based teaching learning approaches. Evaluation criteria checklist for validation of data collection tools and the teaching learning approaches is given in appendix J to P. There was 100% agreement on the content. Two of the experts suggested that the content needs to be concise and slight modification to be made on the video on MDI procedure and also the voice for Peak flow meter for further clarity. Re-recording of the MDI procedure and voice re-recording was done and second validation was carried out. Hence as per the experts’ suggestions, modifications were made in the content area and also the teaching aides.

Preparation of the teaching aides

The investigator explored various methods of teaching learning as a method to improve students' knowledge about respiratory drugs. Respiratory system drugs were sampled out based on the review of literature, where compliance is an issue in India and also Skills related to drug administration to improve their competency to enhance patients’ compliance to drug therapy. The following teaching learning aides were considered appropriate to achieve the objectives of the study.

1. Active lecture cum small group discussion with power point presentation and quiz
2. Demonstration of the four procedures on
   - Oral drug administration
   - Nebulization
   - Metered Dose Inhaler (MDI)
   - Mini Peak flow practice

3. Video form of procedural presentation on the following-
   - Oral drug administration
   - Nebulization
   - MDI
   - Peak flow practice

**Preparation of the final draft**

The final draft of the two teaching learning approaches was made incorporating the corrections and modifications suggested by the experts (Appendix S). Appropriate audio visual aides were used for the teaching learning on B.Sc. Nursing students on learning pharmacology and also drug administration.

**Video recording and editing**

Video recordings of procedures such as oral drug administration, Nebulization, Metered dose inhaler, Peak flow meter use were recorded in a structured setting in the fundamentals of nursing laboratory. Videos were recorded including voice and editing was done. After the editing, the video along with the content and tools were given to the experts for validation. As per the suggestions, second editing was done (Appendix W).
Target population

Population is the entire aggregation of cases in which the researcher is interested. The target population for the present study consisted of second year B.Sc. Nursing students studying in Rajiv Gandhi University.

Pilot study

Pilot study was conducted with randomized controlled design. It was conducted during April - June 2009 at Manipal College of Nursing Manipal (MCON) among 80 second year B.Sc. nursing students. The pilot study helped to determine the feasibility and check for any major flaws in the design used. Formal written permission was obtained from the Dean of MCON, Manipal and also from each student. The 80 students were randomized to control and experimental group through lottery method. The purpose of the study was explained and students were assured of confidentiality of their responses. After obtaining the consent from the students, they were randomized. The knowledge questionnaire, and pre-test skills and nurses’ communication skills were assessed from 1st- 4th day. On 5th 10th day the teaching learning that is active lecture cum small group discussions and quiz programme on the respiratory drugs were held at separate classrooms in different block of Manipal University Campus. The learning equipments like Medication tray with its article, nebulizer, MDI and Mini Peak Flow Meter with adequate mouth piece were provided to both the groups. The lab and the interact thereafter was opened to students to practice what they have learnt in the classroom. After 3 months, the knowledge questionnaire, skill assessment on the four procedures and the nurses’
communication were obtained from both the groups. The control group were then administered the video form of learning on the said four procedures (crossed over) and the opinion on the teaching learning were assessed from both the groups. The control group’s opinion was considered an impact because they had the experience of learning both the methods. The major flaw in the study was the sample contamination. Although the investigator randomized the students to experimental and control group, yet the students stays in the same hostel or study in the same library or goes to the same clinical area for postings, exchange video CDs and hence verbal declaration by the students and findings in the post-test proved sample contamination. Though the study found its feasibility yet with the experts’ opinion the design of the main study was changed to quasi experimental design (Pre-test post-test control group design).

**Findings of the pilot study**

Findings indicates that among the control group, 24(60%) were between the age group of 20-21 years and among the experimental group majority of the students 25(62.5%) were between the age group of 20-21.

Although the students admitted in the college are from PCMB group and also securing more than 60% in their PUC level yet few 4(10%) of control group and 2(5%) from the experimental group respectively have failed in the basic sciences such as Anatomy, Physiology, Microbiology and Biochemistry which are very essential for their understanding of Pharmacology. University result of the subject Pharmacology in 2009 reveals that majority of student secured second class.
Comparison of post-test knowledge scores: The post-test score was significantly higher in the experimental group (mean difference=5.025, $t_{(78)} = 4.281$, $p< 0.001$, 95% CI: 2.95 to 7.1). Hence, using Active Lecture Cum Video (ALV) proved to be more effective than Active Lecture Cum Live Demonstration (ALLD) in teaching respiratory drugs, a unit of their pharmacology subject in second year.

Comparison of post-test oral drug administration practice scores: The mean post-test oral drug administration score of the experimental group after the competency programme using Active Lecture cum Video were significantly higher than the control group. Mean difference = 2.85, $t_{(78)} = 5.61$, $p< 0.001$, 95% CI: 1.84, to 3.86. Hence the competency programme on oral drug administration using video proved to be effective than live demonstration.

Influence of students’ competence in drug administration on the patients’ understanding to drug therapy: The researcher had utilized a three point rating scale on strongly agree, agree and disagree for the competency items. Students in experimental group had higher competency level as expressed by the patient in terms of their competency than the control group. The students in the control group had areas for further improvement. All students (100%) lacked the need to explain to the patient regarding how the medication works for them, regular follow up, 97.7% failed to clear patient’s doubts and also the special instructions. Another 95% botched to explain the need for complete course of antibiotics and its duration. Family members play a vital role in patient’s compliance to drug therapy but 92% of the students could not comprehend the involvement of family members. Hence there is a
strong need for re-enforcement for students in terms of explanation while administering the drug for better patient compliance and also to prevent complications of incomplete treatment.

Comparison of post-test Nebulization practice scores: The Mean Nebulization practice score (Mean difference= 0.55, t (78) = 1.69, p = 0.10, 95% CI: -1.21 to 0.11). Nebulization is a common procedure in medicine units. The students in their clinical postings would have come across quite a few of them to administer and hence their minimum skills of administering would have developed resulting in the present findings indicating no significance.

Comparison of Post-test MDI practice scores: The post-test score was significantly higher in the experimental group (mean difference=3.63, t (78) = 8.11, p< 0.001, 95% CI: 2.73 to 4.5). Hence the competency programme on MDI practice using video proved to be more effective than live demonstration.

Comparison of post-test Mini Peak Flow Meter practice scores: The mean post-test Mini Peak flow meter practice score of the experimental group after the competency programme on Peak Flow Meter practice using active lecture cum video were significantly higher than the control group. (Mean difference= 1.70 t (78) = 6.642 p< 0.001 95% CI: 1.18 to 2.21).

Hence the competency programme on Peak flow meter practice using video proved to be effective than live demonstration.
One of the limitations of ALLD as reported by the students was that, usually demonstration was done only once to a group of 10 students. The demonstration was clearly visible to students who were standing opposite to the demonstrator. Even for those who could view the demonstration clearly, it was difficult to remember each step of the procedure in a single demonstration.

Findings from the pilot study indicate that pharmacology education in nursing has become increasingly important as nurses’ role in administering and educating patients about their medications have grown. Students have rightly brought forth issues on the lack of various teaching learning methods in the normal classroom teaching and also the theory–practice gap in this area of the curriculum. Hence, the findings suggest that the students recognize the need for pharmacology knowledge in practice. Improved pharmacology teaching might increase nurses’ confidence in performing drug administration, patient education, and decrease errors and also anxieties related to these roles. Hence, patient teaching to comply can happen only when the nurse is well verse with the knowledge of current drugs that the patient receives through clinical reasoning, critical thinking and decision making capabilities.

**Main study design**

Present study was conducted with quasi-experimental design. It was a pretest-posttest control group design carried out at two colleges of nursing under Rajiv Gandhi University of Karnataka. This study design was adopted to avoid contamination bias. It is the most commonly used design in educational research. In
this design, research participants are not randomly assigned to groups. Groups are kept intact.

The two colleges selected for the present study were almost similar regarding teaching method, teaching environment, quality and method of student intake and student performance in the university, examination.
The Present Study

Flow diagram of study

Study Population
All the second year B.Sc. Nursing students of Rajiv Gandhi University

Study participants
[Second year B.Sc. Nursing students of two convenient colleges under Rajiv Gandhi University (with 100 students in each college) which agreed to participate in the study]

Students of one college is given intervention and the other is treated as control

INTERVENTION GROUP
n=100

CONTROL GROUP
n=100

Pre-test (day-1)
Knowledge
Competency in oral drug administration, Nebulization, MDI, Mini Peak Flow Meter

Active lecture cum discussion and video form of learning

Post-test (After three months)
Knowledge + Competency in oral drug administration, Nebulization, MDI, Mini Peak Flow Meter, Communication & opinionnaire

ANALYSED
Students who have not taken either pre or Post-test are EXCLUDED from analysis

Post-test mean scores are compared with Analysis of Covariance, taking Pre-test score as covariate

Fig 2: Quasi – experimental design (pre-test- post-test control group design)
Research setting

The researcher conducted the study in two colleges which are situated in Dakshina Kannada District of Karnataka. Two convenient colleges were selected and consent was taken from principal and students. Both the colleges have same number of student intake (100) and are placed under the Rajiv Gandhi University, Karnataka State. The participants selected for the study were the second year B.Sc. Nursing students as the subject pharmacology is taught in the second year. Students of one college participated under experimental group and the other college as control group. To avoid contamination bias, the two colleges were selected with a distance of more than 30 Km.

Sample size

Sample size required to achieve 80% power at 5% level of significance was estimated for medium effect size (0.25). The required sample size was 64 per group. Anticipating absence of a maximum of 15% participants per group for either pre-test or post-test, the required sample size was 76 per group. So, two colleges having a class size of 100 each were selected for this study.

Inclusion criteria

- Students studying in second year B.Sc. nursing
- Students who were present during the study period
Exclusion criteria

- Students who did not attend the pre-or post-test were excluded from the analysis.

Data collection plan and procedure

First year university examination marks of basic science subjects such as Anatomy and Physiology, Biochemistry, Microbiology and Fundamentals of nursing as well as for the subject pharmacology in second year university examination were collected from the record of the colleges. Pre and posttest scores on various knowledge and skills were collected as per the plan given below.

Plan for data collection

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-test O1</th>
<th>Intervention X</th>
<th>Post-Test O2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-1 Control group</td>
<td>Day 1-10</td>
<td>11th day- 14th day Active lecture cum Live demonstration of procedures and quiz program</td>
<td>90 days after intervention</td>
</tr>
<tr>
<td>Group-2 Experimental group</td>
<td>Day 15-24</td>
<td>Day 25 - 28 Active lecture cum video demonstration and quiz program</td>
<td>90 days after intervention</td>
</tr>
</tbody>
</table>

O1- Pre-test on knowledge of pharmacology, observation on oral drug administration, Nebulization, MDI, Mini Peak Flow Meter, and nurse’s communication on patients’ basic rights and patient’s understanding were conducted.
O2- Post-test on the knowledge of pharmacology, observation on oral drug administration, Nebulization, MDI, Peak flow meter, and nurse’s communication on patients’ basic rights and patient’s understanding as well as subjective feed back above the video demonstration CD were conducted. Opinionnaire on the two teaching learning approaches were also collected after the Post-test.

The Interventions given were active lecture cum live demonstration for the control group and Active lecture cum video demonstration for the experimental group.

**Plan for data analysis**

The data were analyzed in terms of the objectives of the study using descriptive and inferential statistics. The plan for data analysis was organized under the following headings.

1. Student’s personal profile of both the groups: Analysis will be done using frequencies and percentage

2. Knowledge questionnaire on respiratory system drugs.

3. Competency checklist on oral drug administration, Nebulization, MDI, and Mimi Peak Flow Meter use.

4. Nurse’s communication on patients’ basic rights and patient’s understanding of the drugs prescribed

5. Student’s opinion on the video form of learning for learning pharmacology.
Summary

This chapter presented the research approach used in the study, the target population, development and selection of tools, development of competency in drug administration, pilot study, main study design and setting, sample size required, procedure for data collection and plan for data analysis.