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Research Article

Vertical teaching principles: pregnancy induced hypertension

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ABSTRACT

Background: The methodology of teaching is of three types. “Adhyapana” refers to “act of teaching” or the “teacher reads”. “Adhyayan” is “self-learning” or the “student reads”. “Sambhasa” or “Tatva vidya” refer to “discussion”. Types of learning are again of three types: informative learning, formative learning and transformative learning. Informative learning produces experts. Formative learning produces professionals. Transformative learning in the context of health education produces leaders with global connection. Millers pyramid of competence evolves the steps in learning as knows, knows how, does and teaches how. The aim of the vertical integrated teaching programme on pregnancy induced hypertension was to enable students to comprehend and teach (sambhasa) pregnancy induced hypertension with firm and reinforced understanding of pathophysiology, biochemical markers, radiological predictors, pharmacotherapy and anesthetic consideration. Neonatal problems specific to pregnancy-induced hypertension were also discussed.

Methods: Problem based and peer instruction approach was followed. The study was conducted as a one-day teaching-learning programme for final year students (168) of Saveetha Medical College, Chennai, India. All the basic sciences and their translation into clinical skills were explained pertaining to the problem of hypertension in pregnancy. Plenary discussion of each clinical case of hypertension and convulsion in pregnancy was done in a galaxy of experts from each department.

The teaching faculty of the department of biochemistry, pathology, pharmacology, radiology, general medicine, anesthesia and obstetrics and gynecology and neonatal medicine provided a learning module in the web forum of university website for the final year medical undergraduate students. The students were able to comprehend pregnancy-induced hypertension (PIH) from its basics and decide on the relevant clinical implications. A case based discussion was done with the constellation of experts from all disciplines of medicine. This was followed with mind mapping of concepts developed. Pretest and posttest helped the teaching faculty to assess the impact of knowledge generated. Feedback was obtained to improvise the existing teaching method and develop new teaching tools.

Results: The median, the 25th percentile, the 75th percentile and extreme values in pretest and posttest group were plotted using Sigma plot. An improvement in scores was observed.

Conclusions: Vertical integration of medical disciplines helps medical students to understand a clinical problem in the light of basic sciences. The modules beginning with the pathophysiology of pregnancy induced hypertension and concluded with anesthetic considerations. An elaborate module helps to translate an understanding of pharmacotherapeutics of hypertension in pregnancy. A well-trained medical student can help to reduce maternal mortality due to preclampsia.

Keywords: Vertical integration, Teaching tool, Pregnancy induced hypertension, Medical student, Maternal mortality, Medical curriculum

INTRODUCTION

Vertical Integration is a new teaching method.¹ The basic sciences of anatomy, biochemistry, physiology is taught together with pathology of the disease. Pharmacology of the drugs used to treat the disease is discussed. Surgical and anesthetic considerations are explained. Finally the disease burdens in society and community implications are also high-lighted. Thus major social problems like hypertension can be discussed elaborately leading to reduced maternal deaths.

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There have been considerable advances in teaching.² However, maternal deaths as a direct and indirect result of hypertension in pregnancy remained to be high. Routine teaching methods have to be modified for those community needs that need immediate attention.

This study was designed to study the teaching methods and develop a strategy best suited for teaching hypertension in pregnancy in our institute.

Learning phases:

The learning in a medical profession can be classified as:

Preclinical learning

In the basic science departments of anatomy, physiology and biochemistry the normal human body structure, function and biochemical balances are discussed. Having understood the normal mechanisms a medical student is taught about the etio-pathology, signs and symptoms. Complications and sequel of the various ailments affects mankind. The microbiological basis of disease is

discussed. The administration, digestion, metabolism and excretion of each therapeutic drug are explained.

Clinical learning

Finally a medical student is given clinical cases where the patient with disease is interrogated for symptoms and examined for various signs. A list of investigations to be ordered need to be prepared. A disease process or a list of alternative disease processes has to be detected. The treatment has to outlined and patient prognosticated.

A medical student is in a quandary of application of basic principles to therapeutic needs of his clinical cases. The amount of knowledge is enormous while the case basics and treatment options relatively less.

METHODS

Preparation of learning module

Induction and orientation programme was conducted. A team of experts from the departments of biochemistry, physiology, pathology, pharmacology, radiology, neonatal medicine, general medicine, obstetrics and anesthesia was briefed on the teaching principle of vertical integration. The idea was to do "with the students" and "for the students" and not "to the students". Each discipline provided the clinically relevant points to reduce maternal anemia. The final module comprised of

- Pathogenesis and pathophysiology of pregnancy induced hypertension.
- Classification of Hypertensive disorders of pregnancy.
- Prediction of preeclampsia and intrauterine fetal surveillance in preeclampsia.
- Biochemical markers of preeclampsia.
- Complications of preeclampsia.
- Drugs in preeclampsia.
- Obstetrical management of pre eclampsia.
- Anesthetic considerations during caesarean section in preeclampsia.
- Medical causes of hypertension during pregnancy.
- Fetal and neonatal problems of a baby born to a mother suffering from pregnancy induced hypertension.

Students were given the learning module in PDF format in web forum a fortnight before the actual clinical problems were given to them. The medical students were divided in groups to facilitate participatory group based activity. The final module was comprehended in 12 batches of 20 students together in the presence of a teaching faculty. It was inferred that students were more interested and alert when the module was read as a group in the form of peer instruction.³ A teaching faculty was available to clear doubts in the module.

Case based discussion

Twelve case scenarios of pregnancy-induced hypertension were given for problem solving to the medical students. According to the barrow taxonomy of PBL methods (Figure 2) the case scenarios were “full problem simulation” and “Student directed learning”.⁴ Students were divided into six groups. Each group of twenty students was given two cases for problem based learning. A galaxy of experts from each department sat with students. The word “assess” is derived from a Latin verb “assidere” meaning to “to sit with”.

In problem based learning, the clinical case scenarios were designed considering the “signal noise ratio”. The “signal” refers to the “original clinical problem” while the “noise” refers to the “associated problems” in the given case. The cases given for problem solving provided the first and second triggers to provide clues for problem solving.

- Epilepsy with pregnancy.
- Pregnancy with oliguria with normal Placental growth factor.
- Severe preeclampsia with HELLP syndrome.
- Gestational hypertension progressing to severe preeclampsia.
- Eclampsia at term.
- Severe preeclampsia with abruptio placentae in labour.
- Severe preeclampsia with IUGR with prematurity with brain sparing effect.
- Post-partum eclampsia.
- Pregnancy at 24 weeks with uterine artery abnormal pulsatility index.
- Severe preeclampsia at term with abnormal erebroplacental ratio.
- Epidural anesthesia in severe preeclampsia with IUGR with reversed umbilical artery diastolic flow.
- General anesthesia in eclampsia.

Plenary session

The cases were discussed (Sambhasha), with the experts of the disciplines integrated. Preeclampsia and eclampsia cannot be prevented, however it can be predicted. Uterine artery pulsatility index is a useful predictive marker in preeclampsia. The experts highlighted that beta-blockers like labetalol, should be the drug of choice rather than calcium channel blockers, as the basic pathophysiology producing symptoms was hyper dynamic circulation and not vasospasm. The role of aspirin in prevention of fetal and maternal complications is through multiple mechanisms. General anesthesia is indicated only if platelet count is less than 50,000 or there are convulsions. There is a blunting of reflex hypotension in preeclampsia following spinal anesthesia.

Mind mapping

The medical students of each group charted the concepts gained collectively. This was a participatory activity as the students of each group took one chart paper to outline their ideas. They signed their names below each chart. They were able to solve the clinical cases with the basic science preclinical knowledge with only a very little help from clinicians.

RESULTS

Pre-test and post-test

A set of twenty multiple response multiple choice questions were used for pre plenary assessment. The same questionnaire was assessed after the case based plenary session was over. The scores obtained were plotted using box charts for pretest and posttest. The median, the 25th percentile, the 75th percentile and extreme values in pretest and posttest group were plotted using sigma plot (Figure 1). It was also found that participation and peer instruction with audience paced evolution of concepts increased concept comprehension. This is in accord with other studies.^{5,6} An improvement of scores was observed.

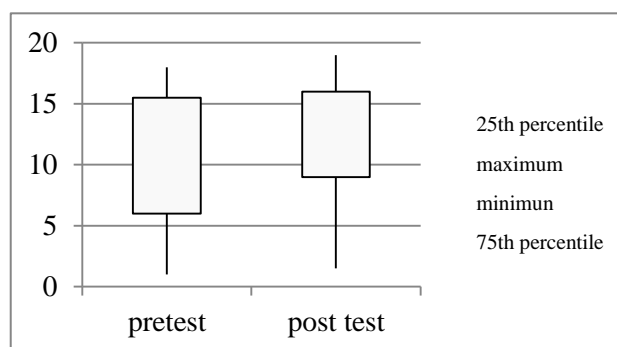


Figure 1: Pretest and posttest depicting impact of teaching.

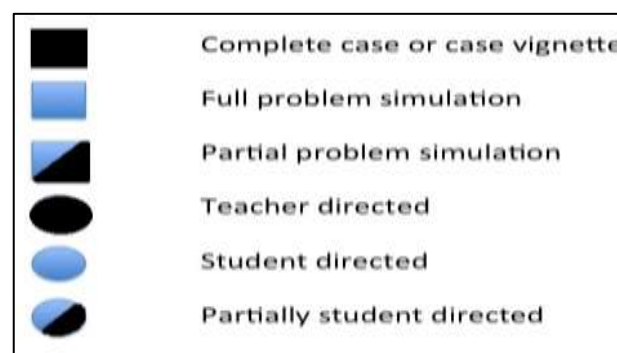


Figure 2: Barrow's taxonomy of problem based learning methods.



Figure 3: Kirkpatrick's four levels of analysis of teaching outcome.

DISCUSSION

Participatory learning activities keep students alert and interested. A thorough knowledge of basic sciences is essential for patient dealing. The clinical skills need to be interweaved in the training matrix through a student-centered approach.^{7,8} A firm foundation of clinical sciences is already established in the preclinical disciplines. The principals of “clinical reasoning process”, “student centered learning”, “self directed learning” and “motivation to learn” have to be incorporated in medical education.^{9,10}

Student surveys have revealed that audience paced teaching and peer instruction were helpful in comprehending the concepts.¹¹ The medical students voted peer instruction and group discussion among themselves as the best learning method. Many students are displaced from family and friends for the first time in medical schools.¹² A joined endeavor by students acting as peer instructors and teachers acting as mentors and role models can inspire students and also address their emotional needs.

The four levels of outcome are expected following any teaching endeavor (Figure 3).¹³ The first outcome is the student reaction or happiness or satisfaction. The second outcome is the learning of knowledge and skills. The third outcome is his behavior transformation while assessing clinical cases. The final outcome is the transfer of results as impact on society. We have assessed the first and second outcomes. The third outcome will be assessed in the internship tenure. Let us all seek insight along with our students and help each other in interpreting and understanding our clinical case in the practice of medicine.

CONCLUSION

Vertical integration of medical disciplines helps medical students to understand a clinical problem in the light of basic sciences. The modules beginning with the pathophysiology of pregnancy induced hypertension and conclude with anesthetic considerations. An elaborate module helps to translate an understanding of pharmacy therapeutics of hypertension in pregnancy. A well-trained

medical student can help to reduce maternal mortality due to preeclampsia.

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