

Impact of clinical teaching on student's knowledge acquisition

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ABSTRACT

Objective: We are in the process of curriculum revision and for that we need to know the strengths and weaknesses of the current teaching program and the venue that may need more attention. To proceed with this aim, we conducted this study.

Methods: The study was conducted on 2 groups of students rotating through nursery as a part of Pediatrics clerkship at King Faisal University, Dammam, KSA, during a 2 month study, April through to May 2001. A 15 item questionnaire was developed for testing. By using a pre-test post-test model, we looked at the scores achieved by the students on the questionnaire before and after 2 weeks of intensive clinical teaching.

Results: In the first group of students, the mean percentage

of correctly answered questions were higher in the post-test (78%) as compared to pre-test (64%), which was statistically significant, $p=0.02$. A similar trend was noted in the second group, the mean percentage of correctly answered questions were higher in the post-test (64%) as compared to pre-test (78%), which was also statistically significant, $p=0.004$.

Conclusions: We concluded that our method of clinical teaching followed during nursery rotation was effective in increasing student's knowledge. However, attention is needed on some topics in which students are noted to be relatively weak.

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One of the major goals of clinical teaching is to boost the knowledge of the medical students. In King Faisal University, Kingdom of Saudi Arabia (KSA), we offer a structured training programme to students rotating through the Department of Pediatrics. In addition to the regular lectures and tutorials, clinical rotation to the ward, emergency room, out patient department and nursery is provided.¹ We are in the process of updating and revising our curriculum as per the international needs.² One of the important phases of curriculum revision is the knowledge regarding the strengths and weaknesses of the current teaching programme and the venue that may need more attention. The clinical teaching program in nursery comprises bedside teaching and case discussions. Is this program effective? Are we as medical teachers making a

difference? To find out the answers for these questions, we mounted this prospective study.

Methods. To proceed with our aim of looking at the impact of clinical teaching on the knowledge acquisition among medical student we selected 2 consecutive groups of students assigned for nursery rotation as part of their pediatric training. The study was conducted at King Faisal University, Dammam, KSA, during a 2 month period, April through to May 2001. The students were unaware with regards to the nature of the study. A pre-test post-test model was used basing on earlier reports.^{3,4} The study plan consisted of a pre-test questionnaire (form B) intensive clinical teaching for 2 weeks, and a post-test questionnaire on the last day, the

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same as used in the pre-test. The clinical teaching consisted of daily case presentations. The case presentations were carried out according to the established guidelines of the unit (Form A). Each presentation was supervised by one of the faculty members. The clinical teaching included the bedside teaching coupled with a detailed discussion of the case. The choices of cases were made according to the availability and feasibility. The priority was usually given to the fresh cases where the mother was still available in the hospital for an interview, so that first hand information regarding history and other pertinent information could be obtained. Cases were never repeated with the same group. A combination of different spectrum of cases were usually chosen with common neonatal problems for example jaundice, respiratory distress, infant of diabetic mothers. The sick extremely premature ventilated babies were not assigned for technical reasons.

Designing the questionnaire. Special attention was given in designing the questions. Single best answer (A-type) and true/false items were used. Combination of answers (K-type) items were deliberately avoided as k-type has high difficulty index.⁵ They are framed to cover the common problems or topics in neonatology, in addition to the common routines followed in neonatal care (Form B).

Statistics. Paired t-test (statistical package for social sciences window version 10) was used to assess the differences in the mean score of the students before and after clinical teaching.

Results. In the first group of students, the mean percentage of correctly answered questions was higher in the post-test (83%) as compared to pre-test (70%), which was statistically significant, $p=0.02$ (Table 1). A Similar trend was noted in the second group, the mean percentage of correctly answered questions was higher in the post-test (78%) as compared to pre-test (64%), which, was statistically significant, $p=0.004$ (Table 2). Among the first group of students, on looking at the individual questions, for most questions (11/15=74%) the response improved. For 3 questions^{3,5} the response remained the same while the response on question number 14 deteriorated without any plausible explanation. For the second group almost the same trend was observed. On looking at the individual questions, for most questions (11/15=74%) the response improved. For 2 questions² the response remained the same while the response on question number 8 and number 14 deteriorated.

Discussion. The present study had demonstrated that our clinical teaching in nursery had a positive effect on student's knowledge acquisition, which was reflected by the significantly higher scores at the end of the rotation among both the groups of students. Our observation was in agreement with the findings of the

Table 1 - Response to the questions from the first group of students.

Question n	Pre-score (%)	Post-score (%)	Comments
1	8/9 (88)	8/8 (100)	Improved
2	7/8 (87)	8/8 (100)	Improved
3	9/9 (100)	8/8 (100)	Same
4	8/9 (88)	8/8 (100)	Improved
5	8/9 (88)	7/8 (88)	Same
6	7/9 (77)	8/8 (100)	Improved
7	2/9 (22)	4/8 (50)	Improved
8	6/8 (75)	7/8 (88)	Improved
9	8/9 (88)	7/8 (88)	Same
10	4/9 (44)	8/8 (100)	Markedly improved
11	7/9 (77)	7/8 (88)	Improved
12	5/9 (55)	5/8 (63)	Improved
13	6/9 (66)	6/8 (75)	Improved
14	5/9 (55)	2/8 (25)	Deteriorated
15	4/9 (44)	7/8 (88)	Markedly improved
Mean score ± SD (%)	70 ± 21	83 ± 21	P=0.02*

* statistical significance
 Numerator is the number of students who correctly answered the questions
 Denominator is the number of students who attempted the questions
 SD - standard deviation

Table 2 - Response to the questions, from the second group of students.

Question n	Pre-score (%)	Post-score (%)	Comments
1	7/9 (77)	8/9 (88)	Improved
2	9/9 (100)	9/9 (100)	Same
3	8/9 (88)	9/9 (100)	Improved
4	7/8 (87)	9/9 (100)	Improved
5	4/9 (44)	5/9 (55)	Improved
6	5/9 (55)	6/9 (66)	Improved
7	3/9 (33)	6/9 (66)	Improved
8	5/8 (62)	5/9 (55)	Deteriorated
9	4/9 (44)	6/9 (66)	Improved
10	4/9 (44)	7/9 (77)	Improved
11	6/9 (66)	6/9 (66)	Same
12	5/9 (55)	9/9 (100)	Markedly improved
13	8/9 (88)	9/9 (100)	Improved
14	3/5 (60)	3/6 (50)	Deteriorated
15	6/9 (66)	8/9 (88)	Improved
Mean score ± SD (%)	64 ± 19	78 ± 18	P=0.004*

* statistical significance
 Numerator is the number of students who correctly answered the questions
 Denominator is the number of students who attempted the questions
 SD - standard deviation

previous report, which also had used the post-test score as a marker of effective teaching.⁶ One argument regarding the findings could be that the improved performance might be reflective of routine undergraduate lectures and tutorials series during those weeks rather than the nursery rotation. Answer to this query comes from the fact that the time between the 2

tests was minimal, 2 weeks for both the groups. For the first group, the lectures and tutorials between those 2 weeks were urinary tract infection, chromosomal disorders, low birth weight and prematurity, rickets and vitamin deficiency, growth and development, leukemia and infant feeding. All students have equal exposure to that except for absentees. Except for one session, all were on general pediatrics. For the second group, the lectures and tutorials were a floppy child, behavioral disorder, Infant of diabetic mother, viral hepatitis, child with cyanosis, cerebral palsy, congestive cardiac failure, failure to thrive, child with bruises and bleeding, meningitis. Except for one, all were on general pediatrics. Another argument could be with regards to the coverage of questions. Few questions are purely theoretical and increment on them does not necessarily reflect clinical teaching. The word 'clinical' actually implies the whole rotation rather than just teaching physical signs. It also includes the observations by the students of the routines. A motivated student with active participation in the rotation will have better knowledge acquisition. An objective structure clinical examination might be a better alternative than multiple choice questions.

Lessons. The persistence of incorrect response to a specific question might reflect defective teaching by the teachers or poor knowledge acquisition by the students. The topics from which these questions were derived need to be re-evaluated and more stress should be given in discussing the pathophysiology and management of perinatal asphyxia. More hands-on practice sessions are needed on neonatal examination, especially examination on hip click. Attention has to be given on the normal routine of weaning from overhead warmer care and respiratory support, as most of the student after finishing the rotation had incorrect response to these questions? These findings will serve as a feedback in updating our curriculum as a part of continued medical education.

Sample size. Out of 32-38 students rotating through different areas of pediatrics, with sub-grouping of the students for nursery rotation, the sample size was limited to 17 participants, with 8 in the first and 9 in the second group. But with our encouraging results and a trend of improvement among students, a larger study could be planned following the same strategy of pretest-posttest with every group. This will make our results more reliable and valid.

In conclusion, the method of clinical teaching followed during nursery rotation in our institution was found to be effective in increasing student's knowledge. However, a little extra effort is needed on some topics in which students scored less well. With growth of the field of neonatology in recent year, it becomes mandatory to give more attention to the clinical teaching during nursery rotation of the medical students.

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Appendix

Form A

Guidelines for case presentation in the nursery

1. *Identification:*
Mother's name, gender, age, medical record number, source of information, birth weight
2. *Chief Complaints:*
(a) Reason for admission with duration (b) Reason for staying in neonatal intensive care unit
3. *History of present illness:*
Details of chief complaints and direct questioning of causes
4. *Maternal history:*
Maternal condition: General health, chronic illnesses, anemia, diabetes, hypertension, etc
Obstetric history (present pregnancy): last menstrual period, estimated delivery date, antenatal visits, progress, problems, ultrasound, medicines, exposure to radiation, infections during pregnancy, serology etc.
5. *Natal history (related to the process of birth):*
Mode of delivery (cesarean section or vaginal), duration, rupture of membrane, anesthesia, (medicine), assistance (vacuum, forceps), bleeding, meconium stained amniotic fluid, traumatic birth
6. *Postnatal history:*
Condition of the baby soon after birth, Apgar score, resuscitation, medication given
7. *Past history:*
Obstetric history, gravida, para, abortions, live babies, neonatal death
8. *Social and family history*
9. *Review of system*
10. *Physical examination:*
General, vital signs, measurements (growth parameters), gestational assessment, systems (start with the system affected)
11. *Hospital course*
12. *Investigations:*
Why carried out and comment on results
13. *Differential diagnosis and provisional diagnosis*
14. *Discussion*

Appendix

Form B

1. Neonatal period is defined as:
 - (a) 0-28 days
 - (b) one month
 - (c) one week
2. Lanugo is:
 - (a) Cheesy material
 - (b) Fine hair
 - (c) Abnormal posture
3. Jaundice could be physiological in neonates () True () False
4. Nasal flaring is normal in neonates () True () False
5. Ventilator care is mandatory in neonates with respiratory distress () True () False
6. Surfactant is given intravenously () True () False
7. Low Apgar score could be secondary to all except
 - (a) Pethadine used during labor
 - (b) Cord prolapse
 - (c) Maternal fever
 - (d) Maternal exposure to radiation
 - (e) Maternal hypertension
8. Hydrocephalus is associated with meningomyelocele () True () False
9. Diaphragmatic hernia is common on right side () True () False
10. Neonates lose weight in first week of life () True () False
11. Which one gives the highest calories per gram
 - (a) Fat
 - (b) Protein
 - (c) Carbohydrate
12. Hip click is normal in premature infants () True () False
13. Incubator care is needed for all except
 - (a) Premature infant weighing 1600 gram
 - (b) Term neonates with respiratory distress
 - (c) Term neonate with umbilical hernia
 - (d) Premature infant receiving total parenteral nutrition
14. Which is the normal cause of weaning
 - (a) Overhead warmer, open crib, incubator
 - (b) Headbox oxygen, ventilator, nasal cannula oxygen
 - (c) Overhead warmer, incubator, open crib
 - (d) Ventilator, nasal cannula, headbox oxygen
15. Infants of diabetic mother are at risk of developing
 - (a) Hyperglycemia
 - (b) Anemia
 - (c) Hypocalcemia
 - (d) Cataract