TEACHING AND LEARNING

An appraisal of anatomy teaching and learning by undergraduate nursing students in a multiprofessional context: a study done at a Medical School in South India

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Abstract: *Aim:* This study was done to assess undergraduate nursing students' perception of the way anatomy is taught in a multiprofessional context.
Methods and results: The study was done at Kasturba Medical College, Manipal University in India. The first year undergraduate nursing students were quantitatively and qualitatively appraised for their perception of the merits and demerits of the present anatomy curriculum. Questionnaires with close-ended and open-ended questions were distributed to the students. It was then statistically analyzed using the software package SPSS. A summative assessment of university examination results of the undergraduate students of the nursing course of the years 2005–2006 and 2006–2007 were empirically compared. The students have rated the time allocated for anatomy teaching as insufficient.
Conclusion: Nursing curriculum worldwide has undergone innovative changes bringing in newer methods of teaching and learning. It is high time that, the developing countries also follow in their wake and take up the issue of undergraduate nursing curricular reform. After recognizing the drawbacks of the present anatomy curriculum it's high time it is revised for undergraduate nursing student level *(Tab. 5, Ref. 17)*. Full Text (Free, PDF) *www.bmj.sk.*
Key words: anatomy curriculum, nursing students, questionnaire, quantitative evaluation.

Human anatomy is a crucial element of modern medical curriculum. It has its origins from ‚*Anatomia*' from ‚*anatemnein*' a Greek word which means to cut up or cut open. It is a branch of Biology which deals with the structure of living things. From a science which was taught using sacrificial victims, to the sophisticated analyses of body performed by modern scientists, anatomy has come a long way.

Anatomy curriculum plays an integral role in the medical education. Effective medical education should be viewed as a continuum. Integration of the basic sciences and clinical medicine should occur throughout the curriculum and self directed, life-long learning should be emphasized (1). Curriculum revision may be appropriate if these fundamental concepts are not met with.

Curriculum development in medical education is a scholarly process (2). It integrates a content area with educational theory and methodology and evaluates its impact. Despite the rapid expansion in nursing roles brought about by social change, there is little change in the curricular structure and content of the nursing curriculum in developing countries. Most of the colleges in developing countries still follow the old system of conventional teaching. In such a situation, a revision of curriculum is of the utmost need. Revision is possible only if an impressive assessment vouches for it. This is where curricular assessment makes its entry.

Curriculum evaluation plays an important role in substantive curriculum change. The curriculum needs to be assessed in a general way for its merit or worth (3). A typical question associated with a general assessment of a curriculum's worth is "How satisfied are students and faculty with the curriculum (4)?" Often both specific questions and a more general assessment may be required. Whatever the goals of the evaluation, it's important to fit the evaluation methods to the goals selected for a curriculum evaluation project.

The choice of evaluation methods flows from the goals of the evaluation process. Curriculum quality has been traditionally assessed by quantitative measures such as course grades or asking students to rate different aspects of learning activities (4).

Anatomy is one of the first year subjects which are common for all the basic health science courses namely, medical, dental and nursing. The anatomy curriculum for each of these courses has to meet the course objectives of each of these courses. Hence the amount of anatomy taught, the number of hours it is taught, the depth in which it is taught, all differs from course to course. Anatomy teaching as practiced by most traditional medical

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schools has limitations in meeting the educational needs of students. Especially in a multiprofessional context it is necessary for an evaluation to assess the question: are the students and faculty satisfied with the present way of anatomy teaching under discipline based curriculum?

Materials and methods

Materials

1) Data collection
Anatomy curriculum for BSc. nursing students

The undergraduate students of Manipal College of Nursing, Manipal, learn anatomy at the department of anatomy, Kasturba Medical College, Manipal. Kasturba Medical College, Manipal offers multidisciplinary courses and hence the anatomy curriculum is built around the curricular rules set up by the governing bodies of various health science courses. The anatomy department of Kasturba Medical College follows a traditional/conventional/discipline based teaching of the anatomy curriculum for all the health science courses. The students learn anatomy through didactic lectures supplemented by audio-visual aids and practicals which consists of cadaveric dissection, prosections or demonstrations depending on the present anatomy curriculum of the courses. The students are also taught histology, but again the way it is taught and the time for which it is taught is delineated by the present anatomy curriculum. The students attend lectures in lecture theatres where they are taught gross anatomy, embryology and neuroanatomy using didactic lectures with the help of audio-visual aids. The students are assessed using a summative method which involves essays and short answers with a smattering of mcqs. The practical assessment involves testing of recall and identification of structures seen in dissection (gross and osteology) and histology. The anatomy curriculum varies in amount of teaching hours, the method of teaching, the presence or absence of practicals (dissection, prosections, histology, osteology, and embryology), the topics taught and the depth to which it is taught, for each of the three different health science courses.

The present anatomy teaching for undergraduate nursing students follows a conventional/traditional/discipline based curriculum based on system wise mode of teaching. The whole syllabus has been spread over 60 hours, based on a certain number of hours for each system of the body. The 60 hours is inclusive of both lectures and demonstration classes. The students do not have dissection classes and histology practicals. The students learn histology during lecture classes through didactic lectures with audio-visual aids. The students have demonstration classes where prosections, bones, embryology models are explained depending on the system being taught. The systems taught to the undergraduate nursing students and the number of hours set aside for each has been given in Table 1.

The present method of assessment of the student's anatomy knowledge involves only theoretical assessment. The theoretical assessment of anatomy is done conjointly with physiology. Practical assessment is absent. The theoretical assessment which is valued for a total of 100 marks is divided into 37 marks for

Tab. 1. Distribution of hours for each system in anatomy syllabus for nursing students.

Systems taught	Hours
General anatomy	5
Skeletal system	6
Muscular system	7
Nervous system	6
Sensory system	6
Circulatory and lymphatic system	7
Respiratory system	5
Digestive system	6
Excretory system	4
Endocrine system	4
Reproductive system	4

Legend: The above table depicts the number of hours set aside to teach each system of human anatomy, in the present anatomy curriculum for nursing students. The total number of hours set aside in the present anatomy curriculum for the teaching of anatomy to undergraduate nursing students is 60 hours.

Tab. 2. Modes of assessment and marks allotted for first year undergraduate nursing students.

Modes of assessment	Marks allotted
Theory	
Paper – I	37
Internal assessment	10
Total	47

Legend: The above table depicts the types of methods used to assess the performance of the first year undergraduate nursing students. It also shows the total marks awarded for the performance of the student in the anatomy examination.

anatomy, 37 marks for physiology, 6 marks for mcqs and 20 marks for internal assessment of anatomy and physiology. The division of a total of 47 marks for anatomy has been shown in the Table 2.

2) Questionnaires

In the present study, questionnaires were prepared to assess the present anatomy curriculum for its effectiveness and capacity to meet specific objective needs of each of the three health science courses. The questionnaires were prepared through a variety of methods. Documented literature on studies utilizing questionnaires, papers published in journals where in the study was done using questionnaires, provided an idea for the making of the questionnaires used in this study. Further the questions to be asked were framed after conducting talks on the present anatomy curricular effectiveness with some of the students and teaching faculty of the medical, dental and nursing courses. A new questionnaire was developed which included simple questions pertinent to present traditional anatomy curriculum. The questions were then framed as close ended questions and open ended questions. The close ended questions were based on the 5 point Likert scale. The Likert technique presents a set of attitude statements. Subjects are asked to express agreement or disagreement on a five-point scale. Each degree of agreement is given a

Tab. 3. Perception of present anatomy course characteristics by first year Nursing students (n = 92).

BSc.NURSING		Strongly agree	Agree	Uncertain/Neutral	Disagree	Strongly Disagree	Total students attempted
Subject matter is clear	Count	0	33	**39**	16	4	92
	%	0.0 %	35.9 %	**42.4 %**	17.4 %	4.3 %	100.0 %
Subject met stated objective	Count	1	**34**	28	23	2	88
	%	1.1 %	**38.6 %**	31.8 %	26.1 %	2.3 %	100.0 %
Teaching pace was good	Count	0	22	**35**	20	15	92
	%	0.0 %	23.9 %	**38.0 %**	21.7 %	16.3 %	100.0 %
Time was sufficient	Count	3	9	9	**37**	34	92
	%	3.3 %	9.8 %	9.8 %	**40.2 %**	37.0 %	100.0 %
Teachers were effective	Count	2	34	**36**	18	2	92
	%	2.2 %	37.0 %	**39.1 %**	19.6 %	2.2 %	100.0 %
Assessment fair with feedback	Count	4	24	**34**	18	3	83
	%	4.8 %	28.9 %	**41.0 %**	21.7 %	3.6 %	100.0 %
Practical sessions clearly defined	Count	18	**41**	19	11	2	91
	%	19.8 %	**45.1 %**	20.9 %	12.1 %	2.2 %	100.0 %
Overall effectiveness of course was good	Count	4	30	**36**	20	2	92
	%	4.3 %	32.6 %	**39.1 %**	21.7 %	2.2 %	100.0 %

Legend: The above table shows the responses made by 92 first year BSc.Nursing students in response to a 5 point Likert scale questionnaire that was administered to them. The questionnaire was an effort to understand the first year BSc.Nursing students' perception of the course characteristics of the present anatomy curriculum that they were going through. The questionnaire was administered to 92 undergraduate BSc.Nursing students.

numerical value from one to five. The responses take the form of "strongly agree" to "strongly disagree," "too difficult" to "too easy," "too fast" to "too slow," etcetera (5−13). Thus a total numerical value can be calculated from all the responses. The questionnaires were then validated by administering it to a group of 10 students, clinical faculty and anatomy faculty each as a pilot study. Depending on the feedback from these groups the questionnaire was modified to give rise to the final draft. This was then administered to 92 first year undergraduate nursing students. The responses of the students have been shown in Tables 3 and 4.

3) Student University examination assessment

The university examination results of the first year undergraduate nursing health science course for the years 2005−2006 and 2006−2007 were taken into account. The university examination marks were collected and compared to see if the examination outcomes were similar during both the years. The marks were also separately assessed for practicals and theory to figure out which learning method the student had performed better in.

Methodology

Statistical data analysis

In the present study, descriptive method is used to quantitatively and qualitatively evaluate the anatomy curriculum offered to undergraduate nursing students and to collect, analyze, interpret/explain the merits and demerits of the same, finally presenting the results/data.

Quantitative analysis

Curriculum quality has traditionally been assessed by "countable", or quantitative, outcome measures such as course grades

Tab. 4. Remarks about the present anatomy curriculum by first year nursing students.

The speed/pace of lectures should be reduced.
The course duration should be increased to adequately cover the syllabus.
The classes should be more student oriented.
The student teacher interaction should be more
Use more audio-visual aids in teaching
Increase the number of dissection and practical hours
Restructure the curriculum to fit the objectives/needs of the course
Make the lectures more simplified
Use the blackboard for teaching.

Legend: The above table depicts the qualitatively analyzed results obtained from the responses made by 92 first year nursing students. Most of the responses indicate an urgent need to modify the teaching methodology that is being presently followed. For the implementation of most of the requests the time-period of the course has to be increased.

or scores on external exams. Students are also typically asked to rate different aspects of learning activities, yielding more numerical data (4).

In the present study the following were quantitatively analyzed.

a) Questionnaires:

The questions which were based on 5 point Likert scale were analyzed using the software package SPSS (Statistical Package for Social Sciences), version 11.5. The responses marked on the questionnaires were entered on Microsoft XL sheet and SPSS version 11.5 was used to find the frequencies of responses which were then tabulated to show the percentage of each.

b) Summative assessment:

The university examination results of the first year under-

graduate nursing students of the year 2005–2006 and 2006–2007 were empirically compared.

Qualitative analysis

It investigates the why and how of , as compared to what, where, and when of. Qualitative researchers typically rely on four methods for gathering information: (1) participation in the setting, (2) direct observation, (3) in depth interviews, and (4) analysis of documents and materials (14).

In the present study, qualitative analysis of the open ended questions administered in the questionnaires was done along with an analysis of literature documented till date on the topic of anatomy curriculum. The analysis was done by reading the responses to the open ended questions and tabulating the repeated sentiments. Thus a list of most important and least important thoughts were formulated.

Results and discussion

The fact that it is student perceptions of the learning and assessment environment that influence the approach adopted, rather than the intentions of curriculum designers or teachers, is crucially important, as these remain notoriously hard to predict (15).

In the present study, questionnaires were administered to 92 students who had completed their first pre-clinical year. The students were questioned as to their perception of the anatomy curriculum they underwent.

The anatomy core curriculum revolves around mainly 3 issues and these are

i) Time/Duration of Course
ii) Syllabus, teaching and learning methodology
iii) Modes of assessment.

Hence the discussion has focused on these three issues and how and why the students have responded to it the way they have done in the results.

i) Course duration/time period

Due to the reduced hours and syllabus the first years feel that they are not able to take full advantage of the course offered to them. Supporting this view is their response which indicated an insufficiency in time which lead to a fast pace which further demoted the understanding of the course, thus making the objectives to be met of the course redundant. So what is seen here is a vicious flowchart of happenings related to one another which is causing the anatomy curriculum offered to the undergraduate nursing students to suffer.

Furthermore, this deficiency of time period reduces the number of classes taken for the students and usually the affected area is practical which includes dissection, histology and demonstration and osteology. To reduce individual time to be spent for each all of these have been clubbed together under demonstration where the students are shown the prosected specimens. This is done in on the overcrowded dissection table where 25 students or more try to catch a glimpse of what is being taught. Thus, the overall effectiveness of the course is reduced as pointed

out by the first year students. The declining knowledge levels of the first year nursing undergraduate students is evidenced in the university results

ii) Syllabus, teaching and learning methodology

According to Charlton (16), anatomy is regarded among educationalists as perhaps the ultimate horror, concentrating as it often does on memorization by rote. Despite the efforts of talented lecturing staff the actual material is too often excessive in volume while deficient in conceptual challenge. All of which makes anatomy unloved by the other preclinical sciences, who see their own subjects neglected while anatomy is being crammed. The first year students have opined that the course difficulty is high and that they are unable to understand the subject. The university results are also a witness to this fact. They find themselves to be burdened with more study material and less time to learn. While the medical and dental students have 3 or 4 subjects respectively in the first year the nursing students have almost 6 subjects and also clinical postings which begin in the first year. Thus from their point of view learning such a vast subject as anatomy in less than a year along with these other 5 subjects is next to impossible. Presently, the nursing students who are taught anatomy using a system based teaching method find it difficult to perceive the body organization due to time constrains. Voicing the merits of dissection the students felt that it is essential to add it to the present curriculum as it provides the student with a 3 dimensional view of the structures and also helps in easy retention of relations and positions that cannot be remembered by rote learning. If the student gets a chance of dissecting the cadaver, at least one single area can be allowed to be dissected so that they have a first hand, hands on experience of the ‚feel‘ of the body and the structures present in it. Dissection being the crux of anatomy curriculum is the weakest point when it comes to the nursing undergraduate student curriculum. There has been no clear mention of the number of hours for practicals by the Indian Nursing Council which is the governing body of nursing in India. The undergraduate nursing course has been given 75 hours for anatomy curriculum by the Indian Nursing council. In the present study, the students have only 60 hours of anatomy prescribed in their course. This further reduces the time spent on practicals which have no time demarcated independently for it, but is rather added as a part of the theory classes. The presently followed system wise teaching has been applauded by both the students and faculty due to its usefulness. The fact that system wise teaching helps the student relate what he is learning in structure with what he is learning about its’ function makes it easier for him to remember. Besides, this method of teaching makes it easier for him to relate more than one subject with each other thus reducing his burden.

iii)Assessment methods

According to Supe (17), the current assessment system frequently fails to assess capabilities beyond knowledge recall. Integrated, interactive student oriented learning is becoming popular. Assessment systems are becoming more objective, with inte-

Tab. 5. University Examination results of nursing first year students – years 2006 (n=99) & 2007 (n=109).

Year	Results of students in Theory (%)			
	Distinction	First class	Second class	Failed
2006	13	61	14	11
2007	4	38	44	14

Legend: The above table depicts the examination results of first year undergraduate nursing students of the years 2006–2007 and 2007–2008. The number of students who took the examination in the year 2006 and 2007 are 99 and 109 respectively.

grated seminars, perceived as interesting learning experiences by students, starting to be organized in many colleges. One of the important motivators of learning in students is assessment. It helps the student in realizing how much of knowledge he has retained and it also helps the teacher to test the capacity of his student. This assessment also helps the teacher modify his teaching to suit the needs of the student. Since there is no testing of practical skills in the first year the student tends to ignore the demonstration classes. The importance of these classes is realized later on when they reach the clinical phase of nursing when they are posted in medicine and surgery where anatomy is a necessity.

University results of anatomy examination of first year nursing students

In the present study, conducted at Kasturba Medical College, Manipal, anatomy examination university results of two batches of first year undergraduate students of nursing of two consecutive years 2005–2006 and 2006–2007 were taken into account. The number of students who had taken the test was 99 and 109 respectively. A comparison of the university results of first year undergraduate nursing students of the years 2006 and 2007 is shown below in the Table 5.

The assessment of nursing students is done on the basis of only theoretical methods, which involves a theory paper with short essay questions and few mcqs. There is no practical assessment of the students. Besides this, the anatomy written assessment is done in tandem with physiology written assessment. The students answer a 100 mark question paper which has three parts to it, one for anatomy, and another for physiology and the third for internal assessment of both. The model of the question paper itself is a deterrent to the true assessment as the line of demarcation between a distinction student, an average student and a failed candidate is very narrow and is often a matter of debate. As the results of the two consecutive years 2005–2006 and 2006–2007 reveal the distinction students have decreased from 13 to 4 while the number of students with a second class has increased from 14 to 44. These are clear indicators of the factor that the students have not been able to grasp the subject in its entirety. The main reason for this is an inability to visualize what they are studying as anatomy is a subject which mainly depends on spatial arrangements and 3-dimensional descriptions.

Conclusions

From the quantitative and qualitative evaluation of anatomy curriculum offered to undergraduate nursing curriculum the following can be concluded.
a) Practicals should be introduced, especially dissection for a more rounded knowledge of the human body.
b) The number of hours of teaching period has to be increased with inclusion of practicals.
c) Certain areas of the human body can be taught better when taught region wise.
d) Introduce a clinically oriented anatomy curriculum which includes tutorials and seminars
e) The mode of assessment should be modified to include a wider perspective of students' knowledge of the subject
f) There is an urgent need for the revision of the present anatomy curriculum to better suit the specific needs of the course, which can be achieved only with the concerted efforts of clinical faculty and anatomy faculty keeping in mind the perception of students.

Anatomists hold a very special place in medical school curricula. There is a prevalent belief among some students that the preclinical years are of limited value for the future practice of their profession. Anatomists must enlighten them to the fact that the basic sciences in general and systemic anatomy in particular, provide the foundation for understanding the impact of disease on patients and dictate their ultimate treatment. As part of this, students must come to realize that anatomy integrates all the basic sciences and is the basis for all clinical sciences. It provides the very skills needed to formulate a differential diagnosis. Thus anatomy teachings being inherently integrative in nature are ideal for curricular integration. Students need to understand that what they are learning at the present time will be useful in their clinical practice in any branch of medicine. They must not and cannot close the book or purge their memory after every test because they are learning for a lifetime. Given the intensity of medical school curricula today, students in their first years of study often focus only on the next upcoming exam. As a result, they often postpone studying for any given discipline's material until just before the next exam. In conclusion, this research study on the exploration and evaluation of student perception of the present traditional anatomy curriculum has provided useful information for curricular improvement. The results of this study strongly support the revision of the present anatomy curriculum to form an overall balanced composite curricular design that meets the needs of the student learner.

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