

Why do medical students forget anatomy later on? A qualitative study

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Abstract

Objective: To explore medical students' perceptions of the factors contributing to retention of anatomy and its relevance to their clinical practice.

Methods: The qualitative study was conducted at Al Nafees Medical College, Islamabad, Pakistan, in February 2017, and comprised final year students who appeared in a test of anatomy based on multiple choice questions. Six high achievers and six low achievers of the test were selected for in-depth one-on-one semi-structured interviews. All interviews were audio recorded, transcribed and analysed using NVivo software version 11. The reasons why medical students forget anatomy later on were found by thematic analysis.

Results: Of the final year batch of 100 students, 64 students volunteered to take the test. A total of 8 themes were identified. Some factors were uniformly distributed among the high and low achievers, but teaching with clinical context, use of learning strategies, teaching core anatomy concepts, and reinforcement was demonstrated more by the high achievers. (70%) Majority of low achievers (55%) showed the lack of use of metacognitive strategies and strategic learning strategies for retention of anatomy.

Conclusions: The factors responsible for retaining anatomy were found to be teaching with clinical context, teaching core content of anatomy, reinforcement and the integration of anatomy in the clinical years.

Keywords: Retention, Anatomy, Clinical years. (JPMA 68: 1228; 2018)

Introduction

Medical students study Basic Sciences for the first two years in a medical college before going ahead with their clinical clerkships. Anatomy, one of the Basic Sciences subject in the medical curriculum, has been recognised as an important subject to lay foundation for the clinical years. A good knowledge of anatomy has always been essential for efficient and safe clinical practice.¹ It is an important concern in medical education that what students are learning and how much of it is retained in their memory.²

In response to this question, most medical schools are modifying their curricula moving from a teacher-centred to a student-centred approach, early clinical encounter to demonstrate relevance of Basic Sciences to clinical practice, and learning across the curriculum.³ Similarly, anatomy curricula have gone through changes in recent years to facilitate students learning.⁴ The question is; are these new institutional methods facilitating student learning and supporting application of knowledge and retention? However, in spite of these modifications, knowledge loss has been reported among medical students' Basic Sciences knowledge during clinical clerkships.⁵

Deficits in retention of anatomy from Basic Sciences to clinical years have been well-documented.⁶ Many senior undergraduate students indicated informally that they did not retain much from Basic Sciences.⁷ If students are not remembering what they have been taught in the early years, and if they don't make use of that knowledge, then the effort is wasted. Retention of Basic Sciences knowledge has been a problem in medical education.

Poor retention, inadequate knowledge of anatomy among medical students, and poor knowledge transfer to the clinics has been reported in many studies.⁸⁻¹¹ Moreover, there is a growing concern among physicians that a major problem of Basic Sciences knowledge taught in the early years is lost during clinical years. The current study was planned to explore students' perception of the importance of retaining knowledge of anatomy. Also, it planned to explore the factors responsible for the retention of anatomy in clinical years.

Subjects and Methods

The qualitative exploratory study was conducted in February 2017 at Al Nafees Medical College, Islamabad, Pakistan. Phenomenology was chosen as the most suitable study design as it uses a qualitative approach for investigating various reactions to, or perceptions of, a particular phenomenon/event.

The target population was final year medical students Those who volunteered to take part were enrolled as

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subjects and were given a test of anatomy based of multiple choice questions (MCQ). The test was based on five Basic Sciences modules and the aim was to select 6 high and 6 low achievers for interviews. Purposeful sampling was employed. The semi-structured one-on-one interviews were taken with saturation point of exhaustion of new ideas and were recorded. Informed consent was obtained from all the subjects and those who did not consent were excluded.

Before starting the study, the internal validity of the study was established by sending the interview questions for expert validation. The questionnaire was modified accordingly in the light of their views and opinions. A pilot study was also conducted after the expert validation of the questionnaire before beginning the actual study on 6 randomly selected students of final year. There were no clarifications needed by the students about the interview questions.

The interview started with an open-ended question: "How did you study anatomy?" This would start a description of the learning strategies they used for learning and retaining anatomy and make room for further questions. No leading questions were asked in order to avoid getting a biased or modified opinion. As far as possible the true ideas of the respondents were obtained.

All interviews were audio-recorded and then transcribed. The transcribed documents were imported in NVivo software version 11 for analysis. All individual documents generated by transcription of interviews were separately coded. All the text was coded generating thematic nodes in the NVivo software version. The emergent themes were named according to the nodes in which the data was stored. Analysis was done using word search queries, word tree queries, word frequency queries and node analysis.

Results

Of the final year batch, 64 students volunteered to take the test. On the basis of interviews with 6(9.37%) high

achievers and 6(9.37%) low achievers, eight themes were identified: Teaching in context; learning strategies; teaching core content; metacognition of the students; reinforcement; peer-assisted learning; use of technology; and skill learning strategies.

The theme 'teaching in context' described the different ways anatomy was learned and retained by the students. The different patterns of study which were recognised to retain anatomy were Incorporation of Clinical Applications, Relevance of Clinical Context, Teaching anatomy with integration and Correlation to clinical practice. Respondent 1 said: "I retained anatomy because of the themes and cases that were introduced and our whole learning revolved around them." Respondent 5 said: "Integration of anatomy with the clinical problems and applications gave me a motivation to study and learn anatomy."

Five (83.3%) respondents from the high achievers mentioned that they retained anatomy for the clinical years due to the application of knowledge taught in the first two years and 3(50%) respondents from low achievers mentioned that they could have recalled better if more of the anatomy was taught in the clinical context (Table).

'Learning strategies' covered all specific actions aimed at maximising study output in terms of learning, application and rehearsal. The strategies described by the respondents were highlighting the content, note-taking, categorising and reading.

These strategies were common among the high achievers while the low achievers didn't report the use of many of these learning strategies.

Respondent 2 remarked: "I used sticky notes to write the important points and put them on my textbook." Respondent 5 said: "I just use my own hand-made notes and the teachers' presentations. I usually highlighted the important points of the book so that at the end there is no need to read the whole topic of the book before the

Table: Number of references obtained from thematic analysis of high and low achievers.

Themes	Total references	Number of references from high achievers	Number of references from low achievers
Teaching in Context	65	43	25
Learning Strategies	102	70	32
Teaching Core content	45	26	19
Metacognition of medical students	44	33	11
Reinforcement	27	18	9
Peer Assisted learning	29	16	13
Use of Technology	11	3	8
Skill learning strategies	39	27	12

exams."

'Teaching core content' described the activities that should be taken in order to control the workload in anatomy. To maximise learning and retention, students needed to know the essential information, what is important for the clinical competence. Subthemes included were: Teach essential information, Reduce curriculum overload, and development of core curriculum of anatomy. Respondent 7 put it as: "There was massive amount of information in anatomy; much of it has never come into use till my final year." Respondent 1 said: "Teachers must revise the anatomy curriculum and write some books on anatomy with essential information for integrated system."

The ratio of high achievers versus low achievers was 6:4 in this regard.

The 'strategies for metacognition' were time allocation for study, time management, goal setting, checking own comprehension, self-evaluation, self-monitoring and scheduling. The high-achieving students mainly explained about the use of these metacognitive strategies.

Efficient time management was stated by students in the form of scheduling and designing a practicable time table to study anatomy. Respondent 2 statement: "Firstly I made timetable to study anatomy. I used to divide the whole syllabus into chunks and made goals for each study segment." It is a brilliant example of planning and goal-setting behaviour by the students.

This theme included 'vertical integration of anatomy; into the curriculum from first year through clinical years to improve knowledge retention in anatomy. The subtheme also included reinforcing the basic anatomical knowledge, revisiting anatomy in clinical years, and longitudinal integration of educational activities. In terms of reinforcement, the ratio of high achievers versus low achievers was 6:4. Respondent 3 remarked: "I used to open my first year books for anatomy and skimmed through the topic while being in surgical clerkship which refreshed my basic knowledge." Respondent 8 said: "Anatomy should be taught till final year with its relevance to the clinical clerkships for adequate knowledge retention of anatomy in clinical years."

Discussion, questioning, teaching and peer feedback were the subthemes under the theme of 'peer-assisted learning'. Most of the students preferred small group discussions very beneficial as they could learn by collaborating with peers. Respondent 4 said: "We used to study anatomy by collaborating with each other.

Everyone used to study a topic and we used to discuss and clear our misconceptions in small group discussions. I also used to teach them the topic best studied by me. We used to ask questions to each other to check each other's understanding." Respondent 5 remarked: "I usually studied anatomy with my friends as I found that teaching others was a better way of learning and retaining anatomy. I learned a lot by discussion with friends."

For 'use of technology' the students described the use of technology such as use of videos, use of internet, smartphones, and the use of educational software as very helpful for learning anatomy as they saved time and effort. Use of videos, pictures and models for skill learning is a useful metacognitive strategy. However, the low-achievers were more in favour of the use of internet as the source of information encoding and retrieval. The low achievers showed greater and more extended use of technology in learning compared to the high achievers. The ratio of high achievers-to-low achievers was 6:2.

Views of respondent 7 were: "I found videos, pictures and some software very helpful in understanding the relations of structures."

Respondent 11 remarked: "I used to see pictures and videos just before the exams to memorise my theoretical knowledge which was very useful."

The theme 'skill learning strategies' described those learning strategies which students adopted for learning of skills. The respondents described strategies such as self-instruction, use of models and mannequins, observation of videos and observation of peers performing skilled activities under this area for recall of anatomical knowledge.

Respondent 6 said: "To memorise anatomy I studied the pathway of nerves and vessels by moving hand on myself or my friend."

Respondent 4 exclaimed: "For better learning anatomy, I used to do surface markings on my own body and applied what all I used to study in anatomy to my own body. This led to a better understanding and recall."

Discussion

Retention of Basic Sciences knowledge has been a longstanding problem in medical education. The present study focussed on determining to what extent the students retain anatomy in the clinical years and what were the factors contributing to retention from high and low achievers. The results obtained indicate several important findings. The key factors identified responsible for retention were: teaching in context, learning

strategies, teaching core essential content, metacognition of medical students and reinforcement.

Our results in terms teaching in context are consistent with the findings of other studies that showed that senior medical students appreciate the importance of Basic Sciences taught with relevance to clinical medicine.¹²

One study reported that when the knowledge is not applicable to clinical context or not directly relevant, it is lost quickly.¹³ Similar studies have showed that the Basic Sciences knowledge learned with clinical application is better comprehended and more easily applied by students in the clinical years.¹⁴

The learning activities described by the respondents of the present study for retention of anatomy were traditional as well as innovative in nature. Some respondents reported use of innovative learning activities very beneficial for their learning and retention. The learning strategies reported by high achievers were repetition, reading rehearsal, concept building (using flow charts), highlighting, note-taking, goal setting, studying in chunks, summarising and observation of videos and rehearsal of skill performance. On the other hand, low achievers didn't do repetition, highlighting, note-taking, summarising and concept building to study anatomy. The low achievers showed greater and more extended use of technology in learning compared to high achievers.

Anatomy is known to have a massive amount of information. Curriculum overload in anatomy was faced by most of the respondents of the study. The students felt overburdened while studying different aspects of the subject in the early years which was a reason for the knowledge loss in clinical years. Large amount of irrelevant material in a curriculum encourages surface learning.¹⁵ Didactic teaching of clinically irrelevant anatomy lacks relevance in the modern medical curriculum.¹⁶ A checklist of essential topics along with appropriate emphasis can give the importance of topics prior to reading about them.¹⁷ This will result in the development of a core document/curriculum available to students and faculty.

Metacognition refers to the knowledge people have about their own learning. It is how an individual directs his thinking process in the right direction in order to achieve the goal, evaluate his learning needs, generate strategies to meet the needs and then implement the strategies.

The present study reveals planning in the form of time management and study strategies of medical students. Goal-setting and time budgeting are both manifestations

of planning of cognition.¹⁸ Greater number of top students manifested the study strategies and time management compared to low achieving students for their retention of anatomy in clinical years. Studies have shown that metacognitive strategies better develop in self-directed learning situations.¹⁹ The present study describes the importance of metacognitive abilities of medical students and reflects the use of planning, reflection, self-evaluation and self-awareness for learning and retaining anatomy for clinical years. Further research may be required for the instruction of metacognitive skills in the perspective of retention.

In our study the respondents believed that lack of reinforcement over time is an attributing factor of knowledge loss of anatomy in clinical years. The low achievers and high achievers both considered reinforcement an important contributing factor for the retention of knowledge in clinical years. Differences in retention of Basic Sciences can be accounted for by differences in reinforcement of rehearsal.²⁰ This ratio may indicate the need of revisiting anatomy during clerkship an important factor to brush their memory cells by most of the respondents of our study. The gap between pre-clinical and clinical application could be bridged by revisiting the important relevant anatomical concepts during clerkship through a structured clinical anatomy course.²¹

The scope of study needs to be broadened in order to achieve more generalisable results. As the participants of the study were final year students, they could not easily spare time for the interviews from their clinical clerkships. The study could have been more reliable by increasing the number of items in the test, but this would have increased the duration of the examination and possibly discouraged the respondents. Secondly, our study has been carried in a private medical college where the primary student intake is on 60% marks, which is another major limitation. Further research is apt to be undertaken in a government medical college for this purpose.

Conclusion

Teaching with clinical context, teaching core knowledge of anatomy, longitudinal integration of anatomy in clinical years, and teaching strategies for retaining anatomy were found to be critical elements essential for knowledge retention.

Disclaimer: This study is part of a Masters of Health Professions Education (MHPE) thesis.

Conflict of Interest: None.

Source of Funding: None.

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