

View Point

Role of Anatomy in Outcome Based Integrated Curriculum for Medical Undergraduates

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Background

It is an acknowledged fact that anatomy is one of the basic medical sciences disciplines which form the foundation for the training of doctors. In traditional curriculum dissection, osteology, surface anatomy, microanatomy and developmental anatomy were considered as essential for medical graduate.

Even today many schools are following traditional curricula, forty five percent teaching hours of basic sciences phase is allocated to anatomy i.e. 650 hours in total 1430 hours of first two semesters.¹ In the early 1980s, it was increasingly recognized that the body of information with potential relevance to medical practice was far too large for instructors to teach or for students to learn.² To view differently, it was rapidly becoming impractical to try and include everything in the undergraduate curriculum.³ Anatomy as a subject has been overly didactic and traditional. As a result, it does not match with clinically trimmed subjects of 21st century medicine. The new system-based curriculum at many medical schools includes less than two hours of gross dissection per week, down from eight hours in the core traditional curriculum. Some schools have entirely removed cadaver dissection from the class room.⁴ Some comparative studies conducted in integrated problem based learning medical curricula had shown that innovations used in teaching anatomy, such as interactive multimedia resources, have not replaced students' perceptions about the importance of dissection.⁵ We will discuss current challenges and measures needed for continued development of anatomy as relevant subject in medical curriculum.

Challenges

Medical education has seen changes driven by evidence from the fields of psychology and education. Retention of knowledge is promoted when students are actively involved in their learning; this research finding supports the view from cognitive psychology that learning is a constructive process in which learners collect new information to their existing knowledge networks, thereby forming and strengthening meaningful connections between concepts.⁶ As a result of this, today, many medical schools have incorporated active learning methods into their course.⁷ This leads to shift from “*Traditional*” teacher centred education to innovative student centred education which focused mainly on active self-directive either in groups or individually. The rise of integrated curricula and approaches that are different from traditional didactic methods has given rise to concern about the level of knowledge attained by students graduating from innovative programs, for basic sciences in general, and for anatomy in particular.²

There are two directly competing realities concerning the pre-clinical years: fast expansion of knowledge in basic medical disciplines, requiring more teaching time and a strong tendency to reduce teaching time, particularly in problem-based curricula.⁸ Anatomy as part of preclinical years has been a cornerstone of medical education for hundreds of years. However, in recent years, human anatomy has been slowly squeezed from the medical curriculum.⁹ In many medical schools dissection as part of the anatomy course has been abandoned or is being phased out.¹⁰

There is a big debate on how to teach anatomy in medical curriculum. This debate polarises into two groups: first those who favour dissection of human cadavers mainly supported by traditionalists (predominantly surgeons and anatomists) and second those who supports newer

teaching modalities (e.g. self-directed learning, problem-based learning [PBL], and computer-assisted learning [CAL]) mainly supported by modernists (predominantly educationalists).⁹ Ethical, moral, and legal issue related to the use of human materials in teaching have been raised regarding dissection of human body.⁴

One of the important factors affecting student's knowledge in integrated curriculum is complaints about the reduction in curricular time dedicated to anatomy.¹¹ Another important factor related to the difference in the level of anatomy knowledge is frequency of revisiting of the topics. Herden et al, 1984 stressed developing of spiral curricula in integrated medical education but studies had proven that clinical topics are integrated easily in early years of medical curricula, integrating basic sciences in the later curricular years appears to be difficult task.¹² Traditionalist have put their view that dissection itself ideally suited as part of self-directed learning; one of the important component of contemporary medical integrated curriculum. Traditionalists perceive a decline in knowledge and attribute it to the modern methods of teaching and learning.¹⁰ One of the most popular modality in modern curricula used as alternative for dissection and anatomy tutorials in many medical schools is problem-based learning (PBL) developed at McMaster University in the late 1970s by Barrows and Tamblyn.¹³ Medical school curricula were developed based solely on small group, student-centred learning. The reason behind this was first that problem-based rather than memory-based learning created a more usable body of knowledge and second that the medical skills that were most important for treating patients were problem-solving skills rather than memorisation.

Patel et al stated that problem-based learning students develop a backward reasoning technique (hypothetical-deductive) to explain clinical cases, while traditional lecture-based students use forward reasoning.¹⁴ As argued by educationist that important benefit of a structured problem-based learning group is due to its relation with psychotherapeutic principles and positive effects on student communication skills.¹⁵

Heyling, 2002 conducted a study in twenty eight medical schools across the United Kingdom and results showed considerable variation in duration and staffing of anatomy teaching, according to the type of curriculum.¹⁶ Heyling's studies raise another concern that as we are using different type of curriculum like system based, PBL based or traditional in different schools, studies suggests there may well be substantial variation in the level, content and depth of anatomical curricula across different schools, and that this should be quantified.¹⁰

Another big challenge during framing of curriculum is within anatomy itself, there is a "*competition for space and time*" between recently introduced but quickly accepted perspectives (e.g., surface and imaging anatomy, applied and clinical anatomy, anatomical variations) that are becoming an integral part of the anatomy teaching.⁸

Future directions:

The focus of medicine is changing and the mere fact of something being traditional does not confirm its validity.¹⁰ In current scenario, many medical schools adapt active learning methods into their courses. Evidence is available that knowledge retrieval is facilitated when knowledge is acquired in a situation resembling those in which it will be applied.¹⁷ Studies pointed to the conclusion that differences between students in perceived and actual knowledge of anatomy are not related to innovative (PBL) or traditional curricula.² More than other approaches, PBL is supposed to facilitate integration of students' knowledge, transfer of concepts to new problems, application of basic science concepts to clinical problems, intrinsic interest in subject matter and development of skills to solve problems, learning how to learn, self-directed learning, and motivation for lifelong learning.¹⁸ By moving towards problem-based scenario, anatomical details are reduced as argued by surgeons and traditionalist but the ability to apply knowledge increases. As we had seen that in traditional

system, anatomy knowledge is taught in first two year of curriculum. Accordingly scholars argued that this practice seems to be educationally unsound, as an excessive amount of apparently irrelevant material in a curriculum encourages superficial learning.¹ We should emphasise on two points for better knowledge of anatomy in integrated curriculum rather than debating for traditional approach. First we should emphasise more to ensure vertical integration of anatomy in developing curricula as evidence showed that integration of basic sciences in clinical years is relatively difficult. This will expose students to anatomy teaching throughout undergraduate (preclinical and clinical), postgraduate and later professional training. Second it has been proved that there is positive effect of visual-spatial ability on medical student's performance in a gross anatomy courses.² We should move towards living anatomy, surface anatomy and medical imaging with inclusion of live body scans, virtual three dimensional images, and plastinated models as learning resources.

Conclusions:

We can conclude that it is unlikely that any future study will prove conclusively the supremacy of one teaching method over another. PBL can be delivered in a useful and constructive way. Curricula should be developed by content experts with taking care of spiral approach proposed by Herden. Vertical integration of anatomy with clinical subjects should be dealt with coordination of educationist and content experts to avoid trimming of important and relevant content of basic science subjects. The core curriculum of anatomy should be designed keeping in mind for skills required for basic medical graduate for e.g. physical examination of patients, interpretation of medical imaging, competencies required for basic procedures. We should not label dissection as synonymous of traditional courses and regard it as antithesis of Problem-based learning (PBL). It should be considered as one of the learning tools in outcome based curriculum. On other hand, there is need to focus on moving from passive, didactic, highly detailed courses towards functionally and clinically relevant courses irrespective of the method of teaching. Study conducted by Prince et al., 2003 showed that the effects of clinically oriented teaching combined with recurrence of topics in the curriculum are more powerful than those of traditional or innovative didactics.²¹ Chakarvarty et al. state that assessment systems must be aligned with teaching methods and curriculum outcomes. It can be concluded that in outcome based curriculum, assessment systems and teaching tool need to be aligned with course objectives or outcomes. After agreement of core knowledge, the assimilation must not assessed rigorously only in the first year of medical school but with on-going assessments throughout clinical school and even beyond. This will stimulate us to focus on teaching tools and knowledge of anatomy students really need to be safe and effective clinicians.

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