An Integrated Curriculum For MBBS

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Abstract

Objective: To report the formulation and implementation of an organ system based integrated curriculum for MBBS students at Ziauddin Medical University (ZMU) Karachi.
Steps of integration: The Basic Medical Science Faculty (Anatomy, Physiology and Biochemistry) along with representatives from Medicine, Surgery and Community Health Sciences held joint meetings spread over weeks to design a system based integrated curriculum for the first two years of the MBBS class. Objectives of an integrated course were devised and the duties of term coordinator determined.
Conclusion: Horizontal integration of Basic Science subjects can be achieved, with the subject specialists coordinating the teaching of a system based as opposed to subject based curriculum. The basic sciences can also be integrated with Community Health Sciences to achieve partial vertical integration (JPMA 51:60; 2001).

Introduction

The Flexner report of 1910[1] led to significant changes in the undergraduate medical curriculum, first in United States, then later throughout the world. It emphasized the importance of the scientific basis of medicine and a good grounding in scientific methods. The concept of spending the first two years devoted exclusively in the pursuit of basic sciences including laboratory work arose out of this educational philosophy. The subject based curriculum, which emphasizes factual knowledge of independent disciplines, lockstep instruction and implicit focus on human disease rather than health became the standard model and continues like that in most of the medical colleges of the world.
A number of developments in the last few decades have forced the medical educationalists to critically evaluate the Flexner model of subject and hospital based curriculum. Foremost among the factors calling for change are a better understanding of the psychology of adult learning, the exponential growth of knowledge in the biomedical field, the questions of social justice and equity and the realization by the medical profession that more than science is required for full health cover.
The consequences of exponential increase is, firstly, the need to pick out which parts of science are relevant to clinical practice and secondly, de-emphasizing the role of mere transfer of information which is likely to become obsolete. Hence, the need to pay greater attention to promotion of self learning[2]. Influenced by these developments in educational psychology, particularly adult learning, medical educationalists have introduced integration, problem based learning and newer assessment methods.
In this article, we present how at this University integration has been implemented for the first two years of the MBBS course. In later articles we hope to outline how some of the other changes like Community based learning. promotion of Self Learning, Problem Based Learning and Continuous Assessment that have been introduced.

The Process of Integration

Basic research on learning has demonstrated that individuals acquire more information, retain it longer,

understand it better and are able to apply it more effectively if it has been taught (learned?) in a functional context[3]. Research has also established that curriculum organization has an effect on students learning outcomes[4]. So one of the first decision to be taken after the permission to start an undergraduate program received was the integration of Basic Sciences. In the traditional system,departments organize and follow their own curriculum, while in the integrated system, different departments formulate and follow common course objectives. To achieve this it was decided to have one functional Basic Health Sciences department (BHS) under one Head of the Department. Thus, we have Faculty members with postgraduate qualifications in Anatomy, Physiology and Biochemistry but for academic purposes they function as one department. This has greatly helped in implementing horizontal integration of the three subjects required to be done in the first two years by PMDC regulations.

The next step was thus the listing of the different organ systems of the body systems. For each organ system, a course coordinator was appointed from amongst the Faculty. The course coordinator with the assistance of 2-3 other faculty members then drew a list of competencies that the students were expected to exhibit on completion of the particular course (terminal objectives). This is done by starting the objective with an action verb such as describe, discuss, identify, perform etc. that clearly tells the students what is expected of them at end of the course (Table 1).

Table 1. Objectives for Respiratory System.

At the end of the course, students should be able to:

1. Describe the gross and microscopic structure and functions of:
   - **Upper Respiratory Tract**
     - Nose & Para Nasal Sinuses - Ear - Pharynx & Larynx - Trachea
   - **Lower Respiratory Tract**
     - Bronchial Tree - Pleural Membrane - Lungs (Interstitium and Parenchyma)
2. Describe the underlying developmental mechanism of the following abnormalities of respiratory system:
   a. Tracheoesophageal fistula b. Respiratory distress syndrome c. Cystic Fibrosis
3. Describe compliance of lungs and the work of breathing with special reference to the structure of Thoracic wall including:
   a. Thoracic vertebrae b. Ribs c. Sternum d. Respiratory Muscles
4. Explain the diffusion of gases through respiratory membrane and factors that affect it.
5. Describe the mechanism of pulmonary ventilation.
6. Given a set of pulmonary volumes and capacity graphs, differentiate between normal and abnormal.
7. Differentiate between normal and abnormal pulmonary function tests and flow volume loops.
8. Differentiate between obstructive and restrictive pulmonary diseases on the basis of pulmonary function tests.
9. Given a set of different values of the partial pressure of respiratory gases, differentiate between normal and abnormal.
10. Given a set of ventilation perfusion ratio curves differentiate between normal and abnormal.
11. Explain the mechanism of transportation of oxygen and carbondioxide in blood.
12. Given a set of oxygen hemoglobin dissociation curves:
    a) Explain the normal curve.
    b) Co-relate the factors involved in the production of abnormal curve.
13. Given a set of Carbon monoxide -Hb dissociation curve:
    a) Explain its effects in binding of oxygen with hemoglobin.
    b) Explain the concepts of respiratory exchange ratio.
14. Describe how hypo and hyperventilation affect the blood pH by producing changes in the blood carbondioxide level.
15. Describe the neural regulation of respiration.
16. Describe various factors responsible for chemical stimulation of breathing.
17. Given a set of Arterial Blood gases, differentiate between respiratory and metabolic causes of acidosis and alkalosis.
18. Describe the regulation of Respiration during exercise, at high altitudes and under high pressure (deep-sea).
19. Explain how different factors produce Hypoxia, Hypercapnia and Dyspnoea.
20. Describe the rationale and types of Oxygen therapy.
21. Describe Pulmonary Circulation and Pulmonary Edema.
22. Describe the role of allergens and occupations in the manifestation of respiratory diseases.
23. Describe the impact of ARI on the health status of children under 5 years of age.
24. Describe the risk factors for ARI in children in a community setting.
25. On the basis of signs and symptoms, differentiate between the following:
    - **Upper respiratory tract infections**
      - Common Cold - Ear Infection -Sore Throat
    - **Lower respiratory tract infection**
      - Pneumonia
26. Describe the general principles of the domiciliary management of ARI.
27. Advise a mother for home care of children with ARI.
28. Given a set of chest x-rays differentiate normal from abnormal.
29. Given a CT scan of chest identify normal structures.
30. Perform physical examination of respiratory system.

Available literature on integration was consulted but no particular plan has been adopted in toto. These objectives were than whetted in meetings of the full BUS faculty. Once the objectives were finalized, the instructional strategy relevant to the objectives was devised. Usually within the structure of an

integrated, system based curriculum design, the learning frame and desired learning outcomes from each course are introduced through lectures reinforced by Problem Based Learning work related experiences, small group discussions and laboratory based practicals[5]. The course objectives of the entire two years have been compiled in the fomi of a booklet, which is supplied to each student. This is different from the traditional curricula where the first two years course is divided into major disciplines, each discipline deciding its course content without consultation with the other disciplines. During the entire academic year weekly meetings ol the full BHS faculty including instructors (demonstrators) are held where the academic programme of the previous week and the coming week are reviewed. Thus the course objectives, the weightage of different parts of the course, the instructional strategy, difièrent assessment tools and the performance of students i.e. the eAtire academic programme is continuously discussed and modified where needed.

Description of Course

Table 1 shows in detail one of the courses - The Respiratory System (Course No: 212) given in the first year. The functions of the Course Coordinator are given in Table 2.

Table 2. Functions of Course Coordinator.

1	Prepare Terminal learning objectives for the course and get them approved in the faculty meeting
2	Prepare learning strategy for the course including the scheduling
3	Prepare problems relevant to the course and get them approved in the faculty meeting
4	Prepare assessment strategy with due weightage to each method of evaluation as well as weightage for individual objectives
5	Select a team of instructors to help coordinate the teaching activities during the term
6	Assign lectures to concerned teachers as per the schedule prepared
7	Arrange field visits
8	Get student's feedback and recommendations on the conduction of the course and the problems given during the course
9	Prepare course report based on student's suggestions and the recommendations of the faculty
10	Discuss the course report in one of the bi-weekly education meeting

Discussion

The opening paragraph of section I of the PMDC regulations for the MBBS degree states the main objective as to prepare a general purpose, community oriented doctor who is competent to deal with the common health problems of the people in a scientifically sound and cost effective manner. The teaching of subjects should be integrated as far as possible"[6].

Following the guidelines of PM DC, we at Ziauddin Medical University have developed an integrated course described in this article. We hope this will help other medical colleges of Pakistan in planning to develop similar courses.

In our experience, having a single Basic Sciences Department greatly contributed to the successful implementation of an integrated course. We realize that being a new institution it was easy for us to do so but for established medical colleges this may need a major policy effort. The appointment of course coordinators assisted by representatives from the other disciplines greatly facilitated the designing and implementation of the organ systems based courses. This also helped develop a rapport between faculty members of different disciplines and helped form an effective team. In our curriculum model, the objectives of the course shown in table 1 clearly outlines how inputs from all the concerned departments can be incorporated in developing the instructional strategy in such a way, that immediately after the structure had been taught by an anatomist, the physiological and biochemical phenomenon related to that structure are dealt with by a physiologist and a biochemist respectively.

Lectures and tutorials on structure of lungs were thus followed by the mechanics of pulmonary ventilation and principles of gaseous exchange in the lungs. Partial integration with clinical sciences was then achieved by inviting a chest physician to talk on pulmonary function tests and arterial blood gas analysis in diagnosis of respiratory diseases, as well as the rationale of oxygen therapy. Similarly the community health aspects were introduced through field visits and problem based exercises relating to management of Acute Respiratory Infections in primary care settings.

In our opinion, integrating curriculum elements provides a more appropriate context for learning medicine. As opposed to the subject centered instruction an integrated curriculum fuses distinct scientific disciplines making learning more meaningful for the students. In the traditional discipline based curriculum where individual
departments do not share the course contents with each other, there is a danger that some material may be omitted by everyone and conversely some material is duplicated. Integration ensures that this does not happen.

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