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Transition from traditional to innovative teaching in and beyond pharmacology at Ziauddin Medical University

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ABSTRACT

Innovative teaching methodologies in different parts of the world are being practiced since last 3 decades. The aim of this review is to report the transition from traditional to innovative self learning process in Ziauddin Medical University, a new medical institute of Pakistan. Various problems encountered have been duly looked after by inducting faculty training programs and regular review sessions in which monitoring of the transition process was duly observed as well as further advancements were also planned. The University being a pioneer has attracted other institutions which have also planned to induct PBL in their curriculum.

Vertical and horizontal integration has also inducted better understanding of subjects and fruitful advantages had been accomplished in subjects as pharmacology and pathology. In conclusion, the initial decision of the university to adapt innovative teaching methodologies along with following an integrated curriculum based on PBL and Community Oriented Medical Education system has now made ZMU a Novel institute amongst other medical institutes in the country.

INTRODUCTION

Ziauddin Medical University (ZMU) is a new institution which emerged in 1996 admitting 50 students as its first batch. Since then every year similar number entered and the first batch graduated in 2001. The batches are identified as batch numbers (Batch I,II,III) or by year of graduation (batch of 2001, 2002, 2003). By now 3 batches have graduated.

In its total life span of 55 years, Pakistan has been fortunate to have about 48 Medical Institutions which are represented chronologically in Tab1: This is the first institute amongst the existing 24 Public sector and 24 private medical institution to introduce a curriculum structured around the tripod of COME (Community

Oriented Medical Education), INTEGRATED and PROBLEM BASED education system^[1].

From the table it can be easily assessed that initially Pakistan had only Government run Medical colleges till 1983 when a first Private Medical University of the country emerged followed by two others till 1992 and then a number of Private Medical and Dental colleges surfaced and in 2003 we have 48 medical institutions including 5 dental colleges.

The Government run medical colleges were/are affiliated with the corresponding university present in the city or province. These colleges had a curriculum provided by the university prepared by the faculty of the medical colleges. The syllabus was purely subject oriented and just listed the topics of the concerned subjects. The method of teaching in basic sciences included didactic lectures, Small group Tutorials that could be called mini-lectures and according to the sub-

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Tab 1. Medical Institutions in Pakistan.

Year	Number of medical/dental institutions	
	Public	Private
1947	2	Nil
Excluding those in 1971	5	intact east wing Nil
1973	11	Nil
1983	11	1
1988	11	2
1992	11	3
2003	24	24
2003Unrecognized*	6	6

* Pakistan Medical and Dental Council (PMDC) is a regulatory body which authorizes medical institutions to function after due inspection. Rules and regulations regarding establishment of a medical/dental college are strictly observed. Details available at PMDC website www.pmdc.org.pk

jects were designated as demonstrations. Practical classes in the basic subjects were/are also teacher oriented but students did perform dissection in anatomy and some skilled procedures in physiology, biochemistry, pathology and pharmacology.

Presently, same methodology is prevailing in nearly all institutions except in some, where endeavor to adapt innovative teaching techniques is being tried. This bold step taken has proved to be a laborious phenomenon due to lack of training facilities and unavailability of trained people around.

ZMU as mentioned above took the very start from an entirely changed system. Prof Naeem A Jaferey, the first Vice Chancellor very wisely has steered the system to a point safe enough to provide a beacon to other interested institutes. To start with, ZMU had a solid plan to adapt PBL as mainstay of the academic system. ZMU was lucky enough to have two more education experts with a trained McMaster background, though new but confident to start the process independently.

The Basic Philosophy of ZMU in Medical Education Involved following major objectives:

1. Curriculum development.
2. Faculty development.
3. Implementation of the system from the first batch.
4. Designing tools of evaluation.
5. Monitoring the process to keep a check and balance in the system.

CURRICULUM DEVELOPMENT

The phenomena of globalization has made the world too small, the ever changing input arising from minute to minute information readily available has widened the boundaries of specialties to such an extent that a single subject has been sub-grouped into many (Surgery: Cardiac surgery, Neuro-surgery, Plastic surgery etc, medicine: Internal medicine, Pediatrics, neuro-medicine, dermatology). Older Concept are being discarded to be replaced by new ones and facts are piling up^[2].

Appreciable changes in the philosophy, curriculum, and assessment methods in medical education, such as a move towards student centred approaches, project work, and wider use of educational technology, may change the learners expectations^[3]. It is also of great change in any significant way since independence, which concerns that the present MBBS curriculum was not based what the British used at the time of world war II^[4]. Hence it was realized that in order to meet the changing scenario in medical education worldwide the curriculum needed review and redesigning in order to meet the changing socio-economic conditions. This curriculum should provide students ample opportunity to learn methods than mere memorization. It should motivate self learning and develop critical thinking^[6].

The University is maintaining a monitoring system by assembling all faculty members thrice a week in which presentations are made for review, comments, modifications of education material which includes PBL's, MCQ's, Schemes and Planners, for the running courses. Reports are the major presentations which give feedback for making any positive improvement in the teaching process. These meetings are chaired by the University President (VC) and attended by senior and junior faculty members including people from medical education and examination departments. Problems are scrutinized and approved for the PBL's for all academic years. The MBBS course duration is 5 years in Pakistan and the subjects taught in sequence as shown in Tab 2.

At ZMU all 3 subjects of 1st year are integrated and a system based curriculum was designed and course objectives framed. The System could be understood from Tab 3 (a) & (b) which shows Planner for 1st and 2nd year course.

While framing the objectives, the main concern was what to include and what not to include. The con-

Tab 2. Existing details of subjects in 5 year curriculum in medical colleges of Pakistan. Family Medicine and Community Medicine only run in some private medical colleges parallel throughout 5-year course.

Year	Designation	Subjects	Comments
1	1st Professional part I	Anatomy Physiology Biochemistry	Exam conducted in systems covered
2	1st Professional part II	Anatomy Physiology Biochemistry	Exam conducted in systems covered
3	2nd Professional	Pharmacology Forensic Medicine General Pathology	Exam conducted in all three subjects
4	3rd Professional	Special Pathology Community Medicine Otolaryngology Pediatrics, Medicine Surgery, Oby/Gynae	Exam conducted in Special Pathology Community Medicine
5	Final Professional	Medicine Surgery Ophthalmology	Exams conducted in Otolaryngology Pediatrics, Ophthalmology Medicine, Surgery

cern of the subject specialist was that each and every detail is included in the course objectives and at the end of the course the student should be able to know every minor details. For example, in Anatomy it was expected that after a module dealing with head and neck, students should be able to describe all the foramina in the skull and after completing the anatomy of the locomotion system the students should know the details of all the surfaces, sulci, grooves, origin/insertion of muscles/ligaments on long bones. One could assume that these minor details are unnecessary for a medical graduate to remember; instead the course should contain relevant material which is essential to be known by a young doctor going to a primary care health Unit. In the making of the objectives a panel of basic science faculty and clinicians from all specialties worked together to formulate teaching material relevant to the requirement of a graduate clinician. The team had a very strong agenda of implementing a modified medical curriculum through teaching strategies never practiced in Pakistan.

Now at age of seven years, ZMU has not only implemented innovated strategies but also had strictly maintained the education system based on PBL-, integration- and COME-based curriculum. Important elements in the curriculum are vertical integration, i.e. integration between the clinical and basic science parts of the curriculum and horizontal integration between

different subject areas. Vertical integration between basic sciences and clinical medicine in a PBL setting has been found to stimulate profound rather than superficial learning, and thereby stimulates better understanding of important biomedical principles. Integration probably leads to better retention of knowledge and the ability to apply basic science principles in the appropriate clinical context^[7].

One of the major hurdles in introducing integration is that it requires transfer of control over curriculum from the departments to curriculum committee. This is a change that is not acceptable to many department heads, thus integration is not just a curricular change, it is a change in social structure of the medical college as well. In traditional system departments organize and follow their own curriculum, while in the integrated system different departments formulate and follow common course objectives

In 1990 onwards importance of community oriented medical education (COME) took a pace in the developing countries and keen interest developed in its adaptation specially in the third world countries. Tireless efforts were made to introduce this important component as a major part of medical education^[9].

The full details of involvement COME in the teaching system of ZMU will not be elaborated here due to space limitation, but as evident in the planners in Tab 3

Tab 3. (b) Proposed planner for 2nd Year MBBS.

ZIAUDDIN MEDICAL UNIVERSITY
 2nd YEAR MBBS 2003-2004
 Batch - VIII
 Class of 2007

SEMESTER-3 (November 20' 2003 - April 05' 2004)																											
Weeks		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21					
		20/11	24/11	1/12	8/12	15/12	22/12	29/12	5/1	12/1	19/1	26/1	2/2	9/2	16/2	23/2	1/3	8/3	15/3	22/3	29/3	5/4					
Endocrine System		Urinary System										Inferential Biostats					Gastrointestinal Tract PHC Concepts & Planning							Semester Exam			
Reproductive System																											
SEMESTER-4 (April 12' 2004 - October 04' 2004)																											
Weeks		23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
		12/4	19/4	26/4	3/5	10/5	17/5	24/5	31/5	7/6	14/6	21/6	28/6	5/7	12/7	19/7	26/7	2/8	9/8	16/8	23/8	30/8	6/9	13/9	20/9	27/9	4/10
Central Nervous System		Analytical Epidemiology										Summer Vacations					Special Senses Reticuloendothelial System							Semester Exam		1st Professional Examination Part-II	

certain courses are run throughout the five year span by Department of Community Health Sciences (CHS). These courses include active practice of epidemiology and biostatistics involving clinical data practically in a community setting.

FACULTY DEVELOPMENT

In Pakistan it is one of the most difficult tasks to get trained faculty. It is not obscure that this third world country lacks facilities in research and training at public and most of the private institutional levels but since last 2 decades some progress is visible in this field. There is only a very small number of PhD's available in basic medical sciences. ZMU started enrolling junior faculty members as postgraduate candidates and their dual role as instructors as well as researchers was a successful experiment as education and research was being achieved side by side. Presently about 30 instructors are involved in this; a couple of them are about to complete their research to be awarded M.Phil degrees. About 6 have already qualified and one senior faculty member has achieved a PhD degree getting trained at ZMU. This policy of ZMU has resulted in a position to be self sufficient regarding faculty development.

IMPLEMENTATION OF INNOVATIVE TEACHING METHODOLOGIES

This aspect of ZMU endeavor will be reviewed in context with the Teaching of pharmacology by PBL which integrates basic pharmacology with clinical subjects. Students encounter Pharmacology when they enter Third Year. By now they are well versed with the process of PBL which they have been doing in their first and second year. Though the problems which they were doing were also clinical oriented by which they were probing their basic subjects of Anatomy, Physiology and Biochemistry. Also they are now used to the phenomena of self learning, they have developed their skills to look for the information not only books but also elsewhere utilizing computer based information sources as they have a free access to internet at ZMU and at home. They are lucky that unlike their counterparts in other medical colleges, they have learnt skills of basic clinical examination during their first two years which include examination of all systems (Cardiovascular, Respiratory, Nervous, Abdominal), additionally they are versed with how to take and interpret

ECG, and identify information revealed by X-rays, CAT scan and MRI. This year they find it more interesting as now it is the treatment side which is being introduced and also their posting with the clinical and family medicine department further encourages their learning.

There is a usual affair that student entering every year is provided with a "Guide book". It contains information such as the year planner, objectives of all subjects, learning resource information, list of books, details about teaching strategies which will be adapted.

The course of third year MBBS spans a time period of about 48 weeks (See planner Tab 4). The schedule is divided into 2 semester. The semesters are designated as Semester V (22 weeks) and Semester VI (26 weeks). Semesters I to IV have been completed in first and Second year MBBS.

PLANNING OF STRATEGIES

The following is the plan regarding running of a module. The objectives are listed with the teaching strategies to be adapted during the module. For comparison the objectives and strategies adapted this year and those planned for the coming batch are given. It is evident that visible changes have been made in the objectives as well as the strategies are more inclined towards PBL and case-based sessions. "Case histories" are being planned to be included in the guidebook for in respective modules so that students coming for the case based sessions are versed with the patient problems which will be discussed by them. These case-based sessions imply vertical integration of pharmacology with all the clinical subjects.

The above table shows a clear transition of the teaching from a teacher-centered conventional traditional system to a modern student-centered approach. Experience in the last few years has taught the faculty that how a self-learning behavior can be induced in the students who prefer teacher-centered system as they have to work comparatively less but they become totally dependent on the spoon-feeding from their teachers. The introduction of the PBL's has reversed the system towards development of self learning attitudes in the students. The clinical problems create probing behavior in them and when they are able to interpret and achieve their task, they feel more self confident.

The situation in Pakistan is not different from that in Hong Kong as reported by Nandni *et al*^[10] in the following observation: Students of the problem-based learn-

Tab 4. Proposed planner for 3rd year MBBS.

ZIAUDDIN MEDICAL UNIVERSITY
3rd YEAR MBBS (BATCH-VII)

SEMESTER-V (From December 01, 2003 to April 26, 2004)																										
		Test-I					Test-II					Test-III					Test-IV					Test-V				
Weeks	Dates	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22			
	1/12	8/12	15/12	22/12	29/12	5/01		12/01	19/01	26/01	02/02	09/02	16/02	23/02	01/03	08/03	15/03	22/03	29/03	05/04	12/04	19/04	26/04			
	Module 1																									
	Module 2		Module 3		Module 4		Module 5		Module 6																	
	<i>Inflammation Autacoids & Anti inflammatory drugs</i>		<i>Immunology Immunomodulating Drugs</i>		Drugs acting on peripheral neurotransmitters and mediators / <i>Wound healing</i>		<i>Disorders of circulation & drugs acting on cardiovascular system</i>		<i>Metabolic Disorder Endocrine Pharmacology Tocolytics</i>																	
	General Pharmacology <i>Cell - Injury</i>		<i>Inflammation Autacoids & Anti inflammatory drugs</i>		<i>Immunology Immunomodulating Drugs</i>		Drugs acting on peripheral neurotransmitters and mediators / <i>Wound healing</i>		<i>Disorders of circulation & drugs acting on cardiovascular system</i>		<i>Metabolic Disorder Endocrine Pharmacology Tocolytics</i>															
Forensic Medicine	Legal Procedure		Personal identity		Ethical & Legal Aspects & Medical Practice		Thanatology		Traumatology		Trace evidence															
Clinical	History Taking and Physical Examination																									
Family Medicine	Family assignments																									

3RD YEAR MBBS (BATCH-VII)

Semester-VI (From May 03 to October 25, 2004)																													
		Test-VI				Test-VII				Test-VIII				Test-IX				Test-X											
Weeks	Dates	23	24	25	26	27	28	29	30	31	01/06	02/06	03/06	04/06	05/06	06/06	07/06	08/06	09/06	10/06	11/06	12/06	13/06	14/06	15/06	16/06	17/06	18/06	19/06
	03/05	10/05	12/05	24/05	31/05	07/06	14/06	21/06	28/06	05/07	12/07	19/07	26/07	02/08	09/08	16/08	23/08	30/08	06/09	13/09	20/09	27/09	04/10	11/10	18/10	25/10			
	Module 7		Module 8		Module 9		Module 10																						
	G.I.T. Respiratory		<i>Growth Disorders & Anti Cancer Drugs</i>		CNS Pharmacology, <i>Genetics</i>		<i>Infectious Disease & Treatment</i>																						
Forensic Medicine	Forensic Sexology		Forensic Psychiatry		Forensic Gen. Toxicology		Specific Toxicology																						
Clinical	History Taking & Physical Examination		History Taking & Physical Examination		History Taking & Physical Examination		History Taking & Physical Examination																						
Family Medicine	Family Assignments		Family Assignments		Family Assignments		Family Assignments																						

ing curriculum found learning to be “more stimulating and more humane” and “engaging, difficult, and useful”, whereas students of the conventional curriculum found learning to be “non-relevant, passive, and boring”. Students who used the problem-based learning method showed better interpersonal skills and psychosocial knowledge, as well as a better attitude towards patients. Students using the conventional model, however, performed better in basic science examinations. Teachers tend to enjoy teaching the newer curriculum. All the following benefits of small group methods in medical teaching^[11] have been achieved:

1. Understanding the subject.
2. Skills in assemble and present information.
3. Critical Thinking.
4. Asking questions.
5. Interpersonal relationship
6. Improved articulation.
7. Stimulation of reading skills
8. Problem solving attitudes.

Tab 5 shows the number of the PBL's in batch

VI.

PBL PROCESS

At ZMU, the process of PBL is supposedly not different from what it is practiced elsewhere. There are about 9 hours are accorded to one PBL which includes 3 sessions of 3 hour each. Routinely a PBL finishes in a week but sometimes due to tight schedule any of the session may be shifted to another week. The first session is the introductory session when the group reads the problem and formulates the learning goals after discussing the problem according to prior knowledge which helps them to demarcate a strategy to go

through various resources. The second session is an unmonitored slot of 3 h declared on the following day whence the group is probing available sources of information as in the coming third session they have to complete task given in the problem. The tutor is facilitating the process, keeping students on the track of discussion sometimes initiating questions which are expectedly answered in relation to the problem to reach the goal. The whole process is being evaluated by the tutor and the scoring is to be submitted to be added to the cumulating marks of the continuous assessment being recorded in the account of each student. The tutor also prepares a report about the overall performance of the group to be included in the final report which is compiled by the PBL coordinator and which is to be presented in the next faculty meeting. In this meeting, the feedback of the PBL is duly discussed and the corresponding tutor duly replies any queries raised by the participants. Any new learning goals are recorded with appreciation to be included next time when the same PBL is run in the next batch.

A SAMPLE PBL TRIGGER PROBLEM

The following example is taken from a trigger problem in the Module of Anti-inflammatory Drugs for Batch IV during Semester V:

Painful ankle A 50 year old man with past medical history of mild Hypertension for 2 years diet controlled Diabetes Mellitus for one year, presented to his doctor with one day history of severe pain in his right ankle. He woke up from sleep due to severe pain around 4:00 am. He was unable to move his ankle. Pain was so severe that even the pressure of blanket over right ankle was unbearable. Pain was burning and throbbing

Tab 5. Chronological review of teaching strategies (pharmacology).

Batch	Year	Traditional Didactic lectures, Tutorials, Demonstrations, Animal experiments	Innovative PBL's, case-based sessions Computer-simulated Experiments on Pharmacokinetics and Pharmacodynamics
1	1998	75 %	25 %
2	1999	70 %	30 %
3	2000	65 %	35 %
4	2001	65 %	35 %
5	2002	60 %	40 %
6	2003	45 %	55 %
7 (projected)	2004	40 %	60 %

3rd Year MBBS (Batch - VI) 2002-2003. Semester V, Module-2 - inflammation, mediators of inflammation and antiinflammatory drugs.

S#	Objective	Strategy				
		Lectures	Tutorials	PBLs	Practicals	Others
1.	Describe the role of inflammation in the defense mechanisms of the body.	1				
2.	Describe mechanism of vascular changes of acute inflammation.	1				
3.	Describe the mechanism of chemotaxis, opsonization, phagocytosis and Lysosomal injury.	1				
4.	Differentiate between exudate and transudate.	1				
5.	List the important chemical mediators of inflammation.	1				
6.	Describe the pathway of Arachidonic Acid metabolism.			1		
7.	Discuss the role of products of Arachidonic Acid metabolism in inflammation.			1		
8.	Describe the mechanism for development of fever, with reference to exogenous and endogenous pyrogens.					Case based lecture
9.	Describe chronic inflammation and its pathogenesis.					Case based lecture
10.	Describe granulomatous inflammation, types and causes.					Case based lecture
11.	Describe the significance of Acute Phase protein.	1				
12.	Describe the mechanism and management of malignant hyperthermia and heat stroke.					Case based lecture
13.	Describe the pathogenesis, clinical features and management of gout and rheumatoid arthritis.			1		

Anti-inflammatory drugs

S#	Objective	Strategy				
		Lectures	Tutorials	PBLs	Practicals	Others
1.	Discuss the therapeutic uses of products of Arachidonic Acid metabolites			1		
2.	Classify anti-inflammatory drugs on the basis of mechanism of action			1		
3.	Describe the clinical uses and adverse effects of NSAIDs				1	
4.	Describe the management of Acute and Chronic Gout					
5.	Describe the acute Toxicity of prototype NSAIDs (ASA, Acetaminophen)			1		

Planning of the same module for Batch 7 2003-2004

S#	Objective	Strategy				
		Lectures	Tutorials	PBLs	Practicals	Others
1.	Describe the role of inflammation in the defense mechanisms of the body.	1				
2.	Describe mechanism of vascular changes of acute inflammation.					CBS I (4 hrs)
3.	Describe the following cellular events in acute inflammation: margination/pavementation, diapedesis/transmigration, opsonization, phagocytosis and degranulation				2	CBS I (4 hrs)
4.	Differentiate between exudate and transudate.					CBS I (4 hrs)
5.	Describe the role of local and systemic mediators in acute inflammation.					CBS I (4 hrs)
6.	Describe the role of cytokines in acute inflammation.					CBS I (4 hrs)
7.	Describe the mechanism for development of fever, with reference to exogenous and endogenous pyrogens.					CBS I (4 hrs)
8.	Describe chronic inflammation and its pathogenesis.					CBS (2 hrs)
9.	Describe granulomatous inflammation, types and causes.					CBS (2 hrs)
10.	Describe the significance of Acute Phase protein.	1				

Anti-inflammatory drugs

S#	Objective	Strategy				
		Lectures	Tutorials	PBLs	Practicals	Others
1.	Discuss the therapeutic uses of products of Arachidonic Acid metabolites	1				
2.	Classify anti-inflammatory drugs on the basis of mechanism of action	1				CBS I (2 hrs)
3.	Describe the clinical uses and adverse effects of NSAIDs					CBS I (2 hrs)
4.	Describe the clinical uses and adverse effects of Glucocorticoids					CBS I (2 hrs)
5.	Describe the management of acute and chronic Gout					CBS I (2 hrs)
6.	Describe the acute Toxicity of prototype NSAIDs (ASA, Acetaminophen)					CBS (2 hrs)

Tab 6. Number of PBL's during 2 semesters.

Module	Course contents	No of PBL's	Comments
1.	General Pharmacology	1	
2.	Antiinflammatory Autacoids	1	Integrated PBL
3.	Immunomodulating	-	Integrated PBL
4.	Autonomic Nervous System	2	Integrated PBL
5.	Cardiovascular Pharmacology	2	Integrated PBL
6.	Endocrine System	2	
7.	Gastrointestinal and respiratory Pharmacology	1	Integrated PBL
8.	Neuropharmacology.	1	Integrated PBL
9.	Growth disorders	-	Integrated PBL
10.	Infectious diseases.	7	Integrated PBL
	TOTAL	17	

in nature and constant. The ankle was swollen, red and felt hot. He was not able to bear any weight on his right boot. He also felt feverish, but did not check his temperature. He recalled having similar episode of severe pain in left big toe about two years ago that resolved in two days after taking some pain medicines.

Current medications Tab Hydrochlorothiazide 25 mg once in the morning started a week ago.

Tab Aspirin - 150 mg/day

Physical examination Middle aged man well built and well nourished in no apparent distress.

List of abbreviations (This is usually not listed, so students need to find out themselves):

-
- BID=Bis in die (Twicedaily)
 - BUN=Blood Urea Nitrogen
 - Cap=Capsule
 - d=day
 - dL=Decilitre
 - GI=Gastrointestinal
 - lab=Laboratory
 - mg=Milligram
 - Min=Minute
 - mL =Millilitre
 - mm=Millimetre
 - NPO=Nothing per orally
 - PO=Per oral (By Mouth)
 - PR=Pulse rate
 - qd=Once a day
 - RBC=Red Blood Cells
 - RR=Respiratory rate
 - Stat=Immediately.
 - WBC=White blood cells
-

B.P 150/98 mmHg; PR.80/min;

RR 14/min; T 99.2 Fo (ORAL)

Joints Right ankle was swollen , warm to touch and erythematous swelling and erythema extended from just proximal to the mid foot to above the ankle joint and extended laterally to involve both malleoli. Range of motion was very limited in all planes was very painful. All other joints were normal. He was given Cap, Indomethacin 75 mg *po* stat. Right ankle arthrocentesis was performed taking aseptic precaution and 7 mL turbid fluid was aspirated and sent to the lab for analysis

WBC 16000/mm Hb; 16 g/dL Platelets 450 000/mm³

BUN: 22 mg/dL; Creathinine: 1.0 mg/dL Ser Uric acid: 9.8 mg/dL

Synovial fluid analysis WBC20000/mm² RBC 110/mm³

Polymorphs 95 % Lymphocytes 3 % Monocytes 2 % GRAM'S STAIN No organisms

Needle shaped, negatively birefringent crystals were seen both free and inside the WBCs on polarized light microscopy.

He was started on Cap. Indomethacin 75 mg PO BID and sent home. Next morning he felt a lot better. He continued to take his prescribed medicines. After a week he presented again with complaints of burning and pain in the epigastrium, feeling of tiredness and black tarry stools. He was taking Syp. Simeco without any relief.

Physical examination revealed:

B.P 146/90 mmHg RR 14/min temp 98 °F

Mild conjunctival pallor and mid epigastric tenderness was noted and rest of the examination was

unremarkable.

Laboratory investigations revealed:

WBC 14000/mm³ Hb 11 gm/dL

Platelets 500 000/mm³

BUN: 80 mg/dL Creatinine 1.6 mg/dL

UPPER GI endoscopy report:

multiple small erosions of gastric mucosa with some oozing of blood from them. No ulcer noted in gastric antrum or duodenum.

Multiple biopsies taken and histopathology report revealed:

Transmural hemorrhage and focal erosion of the mucosa; mucosal and inflammatory infiltrate of neutrophils.

He was given inj. Omeprazole 20 mg qd, kept NPO and indomethacin was stopped. He improved on this regime, resume PO intake and was discharged after two days. His doctor started him on Tab. Allopurinol 300 mg/d, a week after discharge. Five days later he came back again with pain, swelling and redness in his right big toe.

Task for the students:

Discuss the rationale of therapeutic interventions done at each step.

Faculty-derived learning objectives (as a tutor guide):

1. What is the relation of age and sex with the presenting complaints?
2. What is the relation of diabetes mellitus and hypertension with the presenting complaints?
3. What is the reason for one day history of pain in right ankle?
4. How would you relate the presenting complaints with a similar episode of pain two years back?
5. What is the relation of taking Thiazide diuretics and aspirin with the presenting complaints?
6. Interpret the physical examination findings on first visit.
7. Interpret the physical examination of joints.
8. What is Arthrocentesis?
9. What is the significance of aspirating turbid fluid?
10. Interpret the lab findings on first visit.
11. Interpret the lab findings of Synovial fluid.
12. What is polarized light microscopy?
13. What is Needle shaped, negatively birefringent crystals? Why were they found in WBCs?
14. What is the mechanism of action of Indomethacin? Why it was prescribed in stat and then regu-

lar doses?

15. What is the reason for burning pain in the epigastrium and black tarry stools after one week? How this could be prevented?

16. What is Syp. Simeco? What is its mechanism of action of Simeco?

17. Interpret the physical examination findings on second visit.

18. Interpret the lab investigations on second visit.

19. Interpret the upper GI endoscopy findings.

20. Interpret the histopathology report.

21. Why was Indomethacin stopped and started on Omeprazole 20 mg qd?

22. What is Allopurinol and its mechanism of action and indications for its use?

23. What is the reason for the presenting complaints on his third visit?

EFFECTIVENESS OF PBL CURRICULUM IN LEARNING PHARMACOLOGY

At ZMU, the course is run as semesters. With the last batch I was in-charge of one semester (Semester VI) which consisted of 4 Modules only, namely Infectious disease, Neuro-pharmacology, Gastrointestinal, Respiratory Pharmacology and Cancer and its treatment modalities. In this semester of 22 weeks, there were 9 PBL's. Nearly one PBL was conducted every second week. The module of Infectious disease had maximum PBL's (5) and whole of the course was conducted in integrated manner. My observation during this course was that monotony in any particular teaching strategy creates some loss of interest in the students. On one side PBL's does initiate self-directed learning attitudes in the students but on the other loss of interest leads to failure to achieve the course objectives. If the number of PBL's is increased some deficiency has been observed in the evaluation tests. This may also be due to the fact that students basically like spoon-feeding and are fond of didactic lectures where they have to work comparatively less as compared to coming for PBL's where they have to learn all by themselves. Sometimes after all the sessions of a PBL it is found that students have missed some of the objectives. This requires either an extra session or a covering didactic class on the topic.

Comments on the same by other faculty members who are also actively involved in the making and conduction of PBL are summarized below:

1. Integration of Medical Pharmacology Curriculum is highly effective in teaching Pharmacology. In this students learn the basic sciences with intervention of the subjects in pharmaco-therapy of any clinical disorder. The rationale of treatment is also discussed at various levels whereas aspects of research are also highlighted from time to time.

2. PBL curriculum fosters self directed learning, enabling students to expose their understanding to critical analysis, encouraging them to feel responsible for the education of their peers. Attitudes of life-long self-directed learning are also adapted as habits.

3. Integration of pharmacology in the PBL gives students an opportunity to implement their theoretical knowledge in a given clinical scenario and discuss the consequences there of sometimes deriving their learning goals more than what is required as per objectives. This is to be taken as a positive factor as all is done at a self learning basis. If multiple drug therapy is given in a scenario, it is duly criticized and all elements of drug interaction are learnt by derivation.

CONCLUSION

The experience of PBL based curriculum has created a positive understanding behavior in students at different levels at ZMU. Early encounter with clinical subjects as a part of vertical integration is taken with greater interest to learn. Excellent adaptability in the faculty had further enhanced better curriculum design-

ing and planning of teaching strategies. Despite limitations ZMU has accomplished reasonable advances in newer teaching methodologies being followed by other institutions in the country.

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