

ORIGINAL ARTICLE

EVALUATION OF RENAL MODULE IN FIRST SPIRAL

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Background: Medical education has undergone a paradigm shift from traditional disciplinary teaching to ‘outcome based integrated medical education system’. AJK Medical College, since its inception, made an effort to bring the basic, clinical and social sciences into one course by adopting an indigenously designed ‘system based vertically and horizontally integrated modular curriculum’ to meet the local needs and global demands at undergraduate level. This study aimed to assess ‘the Renal Module’ by evaluation of the processes of module designing, content delivery, students learning and academic environment. **Methods:** The renal module program was evaluated by using level 1 (reaction) and level 2 (learning) of the Kirkpatrick Model. The student performance was assessed in the integrated practical examination where basic science knowledge was linked with real life clinical tasks. **Results:** A large number of students and faculty involved in module delivery and assessment showed satisfaction over implementation of the module. Many gave feedback responses with suggestions to improve the organization, delivery and/or assessment of the module that identified the weakness and challenges in design, delivery and assessment of the module. Eleven problem areas were identified by 22 respondents, which were conveyed to the module team for evaluation and recommendation of the required corrective measures in design, delivery and assessment. **Conclusion:** Integrated modular medical curriculum can be implemented at any medical college to replace the traditional system and the evidence based practices are possible, even in resource constraint environment.

Keywords: Medical Education, Modular System, Integration, Examination, Assessment, Modular

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INTRODUCTION

To address the requirements of modern health care system, medical education has undergone a paradigm shift from traditional disciplinary teaching to outcome based integrated medical education system.¹⁻⁶ Learning is best accomplished, when information is presented in meaningful and connected patterns. Fragmented teaching schedules, concerns about curriculum relevancy, and lack of connections and relationships among disciplines led to a drive toward an integrated curriculum.⁷ Medical educationists realized that there was a need for integrating basic and clinical medical sciences, eliminating sharp discipline boundaries as defined in the traditional way of teaching.⁸ Traditional methods of teaching were mainly teacher centred, and basic science teaching lacked clinical relevance.⁹ It has been reported that information presented in an integrated approach with strong clinical relevance captures students' attention and creates more excitement in learning.¹⁰ It has been observed that students trained within an integrated curriculum made more accurate diagnoses than did students trained in a conventional curriculum.¹¹ Moreover, vertical integration between basic sciences and clinical medicine in a ‘Problem Based Learning’ (PBL) curricula stimulated a better understanding of

biomedical principles than did the conventional curricula.¹² Integrated learning is the need of the hour. In recent years, such curricula have been used by faculties of many medical schools throughout the world, including South Asian countries.^{1-3,5,13}

Keeping in view of the local demands and needs in specific and global change in general, the leadership of Azad Jammu Kashmir Medical College (AJKMC) decided to develop, implement, assess and evaluate an indigenously designed system-based integrated modular curriculum at undergraduate level—an effort to bring the basic, clinical and social sciences into one course. This study aimed to assess ‘the Renal Module’ by summative assessment of the students at the end of module and evaluation of the content delivery and learning environment, and development of recommendations to improve the module designing, content delivery, students learning and learning environment.

MATERIAL AND METHODS

The module was implemented in 2nd year of MBBS programme to a class of 100 students. The duration of this module was 4 weeks.

A Multidisciplinary team of faculty members from relevant disciplines deliberated in meetings to develop the Study Guide for ‘Renal Module’ by adopting ‘Six Step Approach’ for the

curriculum development.¹⁴ Meetings of the module team were held for general and learners' need assessment to determine goals and objectives for local and global requirements. Discussions were mainly focused on the expected knowledge, skills and attitude from a family physician to identify, treat, counsel and guide for the management of renal diseases, and sufficient knowledge skill to work as a good intern while pursuing his career in urology or nephrology. The outcome were documented as:

'On completion of the Renal Module, the learners should be able to correlate the anatomic, physiological and biochemical basis of urinary signs and symptoms. They should suggest and interpret the specific laboratory and radiological investigations. They should also have the skills of relevant history taking, physical examination and simple urological procedures, and be able to appropriately use the skills to help the Nephro-Urological patients.'

The module team also developed and approved 'Thematic Core Content' consisting of 4 themes, each based upon a real life situation, i.e., 'Puffiness and oedema', 'Renal and Ureteric Pain', 'Oliguria and end-stage kidney disease', and 'Dysuria and urinary retention'. Within these themes, appropriate and relevant learning objectives were developed that were specific, measurable, attainable, relevant, and targeted' (SMART)¹⁵. The learning outcomes were linked to the themes accordingly.

A 'Table of Specifications' was designed to weigh the different themes according to their clinical significance for delivery schedule and assessment.^{16,17}

Table-1: Table of Specifications for Renal Module

S. No.	Themes	Weightage
1	Puffiness and oedema	35%
2	Renal Pain and Ureteric Colic	20%
3	Oliguria and End-stage Renal Disease	25%
4	Dysuria and Urinary Retention	20%

A Study Guide composed of learning objectives, clinical themes, clinical cases and timetable was prepared and distributed among the students and the faculty well in advance. Entire curriculum was delivered by the clinical case scenarios, each related to a theme.^{18,19} The Student Copy of the scenarios was delivered to the students who worked out the 'learning objectives' of the theme. The Tutors had the Tutor's Copy of the scenarios. They learners were required to understand and explain the cases and collect the relevant information under Tutors' guidance and supervision. The learning strategies employed for discussion and learning included 'Small Group Discussion' (SGD), 'Large Group Interactive Session' (LGIS), hands-on activities like practical, laboratory,

videos, skill labs, 'Directed Self Learning' (DSL) and Journal Club meetings.

For the assessment, test blue prints were developed. Each objective was categorized based on Miller pyramid.²⁰ During the module students were asked to self-assess themselves frequently and had formative assessments also. The module outcome was assessed at the end of module through a structured written examination, comprising of 'Short Assay Question' (SAQs) and single best 'Multiple Choice Questions' (MCQs). On the other hand, clinical skills and attitude outcome were assessed by 'Objective Structured Practical Examination' (OSPE). Another assessment was made at the end of Block where the marks obtained contributed 30% towards the end of year Professional examination (Summative Assessment). A total of 100 integrated MCQs were developed for the assessment; of these, 61 MCQs were application and 39 MCQs were recall.

The overall evaluation of the module was performed by the students by responding to a structured questioner. The results were tabulated as frequency and percentage.

Table-2: Summary of Assessment [n (%)]

Marks Obtained (%)	Number of Students
Absent	3 (3)
<49	8 (8.24)
50-59	20 (20.61)
60-69	47 (48.45)
70-79	21 (21.65)
80-89	1 (1.03)
≥90	0 (0)

The results of the assessment showed that 89 of 97 students scored $\geq 50\%$ marks in the exam. The mean percent score was 57.1 and the coefficient α was 0.77 for the MCQ tests. Among those who appeared, 91.75% passed. Most of students (68) achieved 60 to 79% marks.

Seventy percent of the students who appeared in the assessment gave feedback to the questioner requiring 27 responses. The module was evaluated by use of the level 1 ('reaction') and level 2 ('learning') of the 'Kirkpatrick Model'²¹.

RESULTS

One hundred students responded to the questionnaire. The students' feedback expressed:

- Satisfaction on the delivery and assessment of the module.
- Many gave feedback to open-ended question No. 27 (suggestions to improve the organization, delivery and/or assessment of the module), which identified weaknesses and challenges in the design, delivery and assessment of the module.

Twenty-six respondents identified 11 problem areas which are tabulated as Table-3.

Table-3: Students' Feedback about Renal Module

#	Questions	1	2	3	4	5
1	Module content was targeted to the level of 2 nd year MBBS) students.	28	59	7	3	1
2	Core content/themes and learning outcomes were clearly stated in study guide.	25	60	9	3	3
3	The study guide provided a road-map to learning and its hard copy/ soft copy was easily accessible in college library.	25	53	13	4	3
4	Module content organization demonstrated a planned continuum of learning from basic to complex structures/concepts/problems.	13	68	10	7	1
5	There was horizontal integration between parallel subjects taught in same year(i.e., between Anatomy-Physiology-Biochemistry-Histology & Embryology)	21	60	7	6	6
6	Module core content was organized around themes which showed integration of Basic Medical sciences with Clinical Sciences.	21	62	4	9	4
7	Modular presentation of curriculum enhanced/improved knowledge, skills and attitudes.	25	57	9	3	4
8	Learning objectives of each session were provided by the teachers before OR during that session.	7	57	13	7	13
9	Students were trained to collaborate and cooperate effectively in small group teams.	16	65	9	3	4
10	Students were encouraged in the module to be a part of or build a social network to support their learning.	13	59	16	9	1
11	The teaching strategies adopted in curriculum equip medical students for lifelong learning.	12	59	18	4	3
12	The curriculum emphasizes the importance of attitudes and professionalism in the doctor as well as the acquisition of knowledge and the development of skills.	19	65	9	3	3
13	Learning outcomes of the module include communication skills.	13	69	7	4	3
14	The curriculum equips the students with the ability of critical thinking including making inferences, building arguments, and making sense of what is observed and expressed.	12	65	18	3	1
15	The curriculum equips medical students with research skills and provides them with opportunities to undertake small scale research projects.	13	62	13	7	4
16	The curriculum equips the students with the IT skills that will allow them to retrieve and acquire knowledge whenever and wherever needed.	16	66	13	3	1
17	Students were provided with sufficient /appropriate time in timetable for self-directed learning activities.	16	43	13	6	13
18	The Module adopted a problem-based approach where learning was structured around a set of problems.	16	60	10	1	1
19	The clinical problems/Vignettes were used as trigger for teaching & learning sessions, which provided a clinical context to relate basic science knowledge to real life clinical problems.	16	62	4	6	1
20	Small group discussions encouraged my participation and active learning in a non-threatening environment.	16	66	6	1	0
21	Lectures were effective to clarify important concepts.	13	46	16	7	6
22	Wrap-up sessions helped to clarify misconceptions and standardize learning of all groups to an acceptable level.	10	59	7	6	7
23	The practical & skills Lab sessions provided me the opportunity for hands on experience.	22	57	7	1	0
24	The written assessment of module was integrated rather than each subject being assessed independently.	15	66	6	3	1
25	The curriculum develops students' ability to assess their own competence.	18	68	6	0	0
26	The assessment was authentic, fair, transparent and relevant (closely related to the work of a doctor).	18	62	7	3	0
27	Suggestions to improve the organization, delivery and/or assessment of Module:					

KEY: 1. Strongly Agree, 2. Agree; 3. Uncertain, 4. Disagree, 5. Strongly Disagree

Table-4: Students' suggestions to improve the organization, delivery and/or assessment of Renal Module (Response to Q. No. 27)

S. No.	Suggestions	Responses
1	Follow the schedule strictly	1
2	Organize timetable according to Study Guide	3
3	Arrange more lectures of physiology	2
4	Arrange less PBLs as LOs do not get clear	2
5	***** is not taught properly	3
6	Arrange more SGDs	2
7	Arrange SGD earlier; in morning time	2
8	Easy topics were repeated, whereas many difficult topics were not discussed in SGDs	1
9	Physiology learning opportunities were not according to the study guide	1
10	Wrap ups were not conducted and our deficiencies were not addressed	5
11	Kindly, replace professor ****	4

DISCUSSION

Integration of the disciplines both vertically and horizontally is possible even with several restraints. This program was evaluated, using level 1 ('reaction') and level 2 ('learning') of the 'Kirkpatrick model'²¹. The 'learning' is concerned with measuring the knowledge principles, facts, techniques, and skills

presented in a program. In this case, the outcomes related to bedside performance would take a few years to establish but behavioural change (level 3) requires frequent measurements, not possible at present. However, the student performance in the integrated practical examination was assessed where basic science knowledge was linked with a real life clinical practice task. This may reflect some effect on the clinical performance.

The feedback from the students was encouraging and it also exposed the areas requiring improvement. Our results are consistent with experiences in other developing countries. Vyas *et al*⁵ described a positive feedback from the students and faculty that highlighted the benefits of integrated learning of the basic sciences with clinical cases led to the active student learning. Most of them recommended the continuation of the integrated program.⁵ In a study by Ghosh and Pandya¹, the results of the feedback from 1st year students and faculty members after an integrated learning program was introduced showed that the majority of students rated the program as 'good to excellent' in regard to

appreciation, understanding, and application of basic science knowledge in health and disease. Seventy-eight percent of their students felt that the program would help them perform better in their later days of clinical training. However, 60% of their students felt that the integrated program might not be helpful in performing better in the summative university (professional) examinations, which are conducted yearly in our 5 year curriculum. The first two university examinations mainly consist of basic sciences. This notion mainly arises due to a mismatch between the delivery and assessment. If the assessment continues to be 'subject-based' and not inline with the curricular change, it is bound to create confusion. A previous study¹ has shown that such a mismatch can eventually lead to failure of any adopted curriculum. Another study²² demonstrated that the students clearly enjoyed the experience of case stimulated learning and perceived that it was valuable. This is consistent with our results where 38% of the students agreed that case-based learning was useful.

In a survey conducted at Ziauddin Medical University (Karachi, Pakistan), which follows a PBL curriculum, the integrated curriculum course was favoured over conventional lecture based education by both the students and faculty members. They observed that 88% of the students considered PBL as relevant to the course objectives and that the material was covered in a logical sequence. A total of 65% of their students agreed that the course reflected an integration of theoretical knowledge with practical application. In all, 81% of their students agreed that PBL items motivated them to consult various learning resources. Interestingly, 39% of their students agreed that use of PBL alone was more effective than lectures in facilitating subject understanding that once again can be a reflection of a long lasting passive learning approach.²³ In our case, PBL was used as one of the learning strategies along with large group interactive sessions, small group case-based discussions, and integrated practical learning. Similarly, medical students in Saudi Arabia responded positively to integrated case based learning and were able to answer problem solving questions in a better way.¹³

In our modules, formal learning of important competencies related to medical ethics, professionalism, and communication skills that are generally ignored in the traditional curriculum²⁴ was also introduced. History taking, physical examination, professionalism, and communication skills were also assessed during the integrated practical examinations. The ethical issues were also incorporated in the written assessment. About half of the students agreed that the issues related to ethical professional aspects were well integrated with the medical knowledge. The students' feedback on learning methods was mostly positive.

They suggested improvement in organization and structure of the module. At the same time, their feedback is being incorporated to refine the delivery in the coming years.

Limited resources, scheduling conflicts, and resistance from senior and junior faculty members, students, and their parents were major hurdles in implementing the curriculum in a new system. In local culture of extended nuclear family, the parents are mainly responsible for sponsoring their children's education and, therefore, want active involvement in their children's progress. An integrated curriculum is something new in medical colleges of Pakistan. The new system created anxiety in parents as well, when they compared it with curricula in other institutions. This required reassurance and counselling on the institution's part. AJKMC was able to launch the initiative despite all the constraints and succeeded in developing optimum learning environment. The PBL sessions were conducted with flip charts provided to each group. The library was also developed in regards to resources and physical space along with 40 web-enabled work stations for efficient searching. The skill labs provided the space for developing communication and procedural skills training. The orientation and training of the faculty members through seminars and workshops helped to overcome the reluctance of some faculty members to shift to a new curriculum model. The training was carried out by inviting regional and international experts in medical education. Several of the faculty members engaged in medical education provided constant input in integrating the various disciplines and refining delivery strategies. Scheduling conflicts were overcome by rescheduling the other classes that were occurring at the same time. The counselling of the students was accomplished by the advisory committee, by listening to and discussing their queries and problems and incorporating their reasonable suggestions into the system.

The training of the faculty members through workshops on conducting case-based group discussions, integrated practical sessions, and developing integrated assessment tools are helpful in implementing this system successfully in any medical colleges.

At the end, we think that the integrated method of curricular delivery is well received by students and faculty members and it can be successfully used in undergraduate medical education in developing countries.

CONCLUSIONS

Evaluation of module by students and faculty identified weaknesses and challenges in design, delivery and assessment need to be addressed while designing renal module for next class accordingly

making the curriculum Dynamic. Design, delivery and assessment of integrated curriculum are laborious, demanding and challenging. Setting in motion the evidence-based practices is possible even in resource constraint environment of a public sector medical college. Further work is needed to evaluate Renal Module as a part of continuous improvement process.

RECOMMENDATIONS

A gradual shift from traditional to integrated curriculum is required in other medical colleges too.

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