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EDUCATION FOR HEALTH

ORIGINAL RESEARCH PAPER

Integration of Geriatrics into a Spiral Undergraduate Medical Curriculum in Pakistan: Evaluation and Feedback of Third-Year Medical Students

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A B S T R A C T

Background: In the last decades there has been a sharp rise in the elderly population throughout the world. The unique needs of the elderly require a multidisciplinary and comprehensive medical approach. None of the 50 medical schools in Pakistan teach geriatrics in their undergraduate or postgraduate training. This paper discusses the development and implementation of the first geriatric curriculum in a medical school of Pakistan and its effect on knowledge and attitudes of third-year medical students.

Methods: The curriculum was designed through collaboration and approval of various academic departments at the Aga Khan University in Karachi Pakistan. After a review of existing geriatric curricula at other institutions, a problem-based, inter-disciplinary spiral curriculum was designed. Strategy of student and course evaluation was planned and incorporated in the curricular program. No extra resources or funds were used. A component of the new curriculum was assessed by evaluating pre- and post- course knowledge, and seeking feedback from participating third-year students.

Results: A significant improvement in mean scores for summed overall knowledge in geriatrics (pre-test mean 4.7 vs. post-test mean 6.4, p value of <0.001; out of a maximum possible of 9 was noted. Breakdown of knowledge mean scores into component areas of knowledge showed a significant increase in understanding in aging demographics (pretest 0.7 vs. post-test 1.7, p value of <0.001), geriatric history taking (pretest 0.64 vs. post-test 0.88, p 0.001) and geriatric assessments (pre- test 1.4 vs. post- test 1.7,



p value 0.01). A strong majority (87%) of the students felt that the overall course objectives were achieved. All students were satisfied with the quality of teaching, 90% rating it good or higher.

Conclusion: An important advance in medical education was achieved via integration of a low cost, spiral geriatrics curriculum in a medical university of Pakistan. We found that introduction of the geriatric curriculum improved the knowledge of third-year medical students. This was our school's initial step towards building professional capacity in response to a rising elderly population.

Keywords: Evaluation, feedback, Geriatrics, undergraduate medical curriculum.

Introduction

There has been a sharp rise in the elderly population throughout the world. Population figures from United States of America and United Kingdom show people older than 65 years comprise 12.9% and 16% of the population respectively^{1,2}. According to the United Nations Population Fund, 9% of the present Asian population is elderly. Globally the number of elderly are expected to increase three-fold by 2050³.

This rise of the aging population has had an impact on the practice of medicine, as the unique needs of the elderly require the presence of a multidisciplinary and comprehensive medical approach. The need for geriatric education has been repeatedly cited^{4,5} in the United States where, according to one study, every third patient seen by a student, is elderly⁶. A survey of US medical schools showed that 71% percent of schools either had a geriatrics as a medical student clerkship or as part of a required clinical rotation⁷. Teaching geriatrics in medical schools leads to improvement in geriatric knowledge, skills and attitudes of undergraduate medical students^{8,9}.

The revised curriculum mandated by the Pakistan Medical and Dental Council (PMDC) for undergraduate medical programs is followed by all 50 medical colleges in Pakistan and has no requirement for geriatric education¹⁰. The College of Physicians and Surgeons of Pakistan (the post-graduate medical licensing body of Pakistan) also does not have an approved residency or fellowship program in Geriatrics¹¹. Geriatrics does not exist as a separate specialty, and elderly medicine is fragmented into specialist, disease-focused care in Pakistan. This is often compounded by lack of an infrastructure at a governmental and societal level required to meet the medical, social and financial needs of our elderly. This makes access to medical care difficult for this vulnerable age group¹². With an increase in our elderly population it thus becomes even more important to familiarize Pakistani physicians with the basics of geriatric medicine.

The Aga Khan University (AKU) is a private, autonomous institution, established 25 years ago, that has undergraduate and postgraduate medical and nursing programs. The need for geriatrics education at our university was recognized at different levels. First, a review of the AKU undergraduate medical curriculum was conducted by an international survey team in 2006. This review highlighted the absence of geriatric training in the undergraduate curriculum, and in accordance to the US Liaison Committee on Medical Education Guidelines (LCME), the international team suggested incorporating geriatrics teaching in our medical school.

Secondly, the number of geriatric patients admitted to our university hospital also increased in recent years. According to hospital discharge data, every fifth patient admitted in the past three years was 65 years or older. Outpatient visits also showed similar



statistics across medical and surgical specialties further justifying the need to educate our medical students in the field of geriatrics. With this background, a plan to incorporate geriatrics teaching in the medical curriculum was made in 2008. This paper discusses the development and implementation of this geriatric curriculum in a medical school of Pakistan and its effect on the knowledge of third-year medical students. The curriculum was designed and implemented in late 2008. Knowledge testing and feedback was obtained for one full academic year ending in late 2009. This paper was conceptualized and written in 2010.

Methods

The Aga Khan University, with approximately 500 medical students, has a five year undergraduate medical education program. It recently underwent a successful transition from a traditional curriculum to an integrated curriculum with problem-based learning as one of the teaching/learning strategies.

Curricular Design

After approval from the Dean of the Medical College and Chair of Curriculum Committee, collaboration was established between the departments of Family Medicine and Internal Medicine to begin work on the geriatric course. A detailed study of curriculum design and planning was then undertaken¹³⁻¹⁵. The student-centered, problem-based, integrated, community-based, electives, systematic (SPICES) model¹³ seemed most applicable in our setting and was adopted.

Background work also included a review of existing geriatric curricula in other countries and schools. Key topics were identified through an overview of American Association of Medical Colleges' list of common geriatric competencies¹⁶. Another important resource was the John A. Hartford Foundation which provided a brief summary of geriatric teaching learning strategies adopted by various medical universities across the US¹⁷. The ten step model for enhancing geriatrics in undergraduate medicine¹⁸ also served as a guide as it closely mirrored our needs of integrating a geriatric course into an existing curriculum and described the necessary steps required to implement it. The overall aim was to introduce a geriatrics education program within the existing curriculum and time allocated, starting from year one of the curriculum. A problem-based, interdisciplinary spiral curriculum with specific year wise objectives was therefore conceived. The spiral curricular model would allow exposure at pre-clinical and clinical levels with increasing complexity of problems across the years and opportunities to revisit topics in the later years as well.

The current undergraduate curriculum of the AKU was also reviewed to identify geriatric topics already being taught, like osteoporosis and benign prostatic hypertrophy,) to avoid duplication. A list of new key geriatric problems was then shortlisted based on existing clinical problems seen in the elderly¹² and merged with the ones that were already part of the curriculum.

Exit level and specific enabling objectives of the geriatric program were made. These were reviewed by the Department of Education Development and developed into specific year objectives.

Teaching/learning strategies were devised and consisted of small group tutorial sessions, case based scenarios, role play, simulated history taking and a few large class format sessions. A major step at this point was involvement of all faculty concerned with the curriculum. Extensive communication via email, and one-on-one meetings were held to get support from departments and individual faculty. Teaching/learning slots were then designated and incorporated in different rotations (Table 1). Strategy of student and course evaluation was also planned and incorporated.



Table 1: Distribution, teaching and assessment strategies of the undergraduate geriatric curriculum

Content /Topic	Specialty	Teaching strategy	Year of training	Assessment method
Aging Physiology GI, CVS, Resp. and Renal	End of year 1	LCF, PBL	Year 1	MCQs, SAQs
Aging Physiology CNS, Endo, MS, Reproductive	End of year 2	LCF, PBL	Year 2	MCQs, SAQs
Principles of aging pharmacology	End of Year 2 reinforced in clinical rotations	LCF	Year 2	MCQs
Geriatric Assessments H and P, ADLs, IADLs, MMSE, Gait Assessment, Minicog	Family Medicine, Internal Medicine	Tutorial Group Sessions, Case based discussions	Year 3	Osce
Visual and hearing changes in the elderly*	Family Medicine /Eye and ENT	Tutorials	Year 3	MCQs
Geriatric Depression including GDS, Dementia	Psychiatry	Case Based	Year 4	MCQs
Geriatric Gynecology Female Incontinence, Osteoporosis	ObGyn	Case Based, Tutorial	Year 4	MCQs
Geriatric Neurology Delirium, Dementia, Parkinson's, CVA *	Family Medicine and Internal Medicine	Case based, Tutorial, core curriculum	Year 5	MCQs, OSCE
Falls/Syncope	Family Medicine/ Internal Medicine	Case based, core curriculum	Year 5	MCQs, OSCE
Male incontinence/BPH *	Urology	Tutorial, Case Based	Year 5	MCQs, OSCE
Pressure ulcers	Surgery	Tutorial	Year 5	MCQs, OSCE

* already present in the existing curriculum

Abbreviations:

- GI: Gastrointestinal
- CVS: Cardiovascular
- Resp: Respiratory
- LCF: Large Class format
- PBL: Problem based case
- MCQs: Multiple Choice Questions
- SAQs: Short Answer Questions
- CNS: Central Nervous System
- Endo: Endocrinology
- MS: Musculoskeletal
- H and P: History and Physical examination
- ADLs: Activities of Daily Living
- IADLs: Instrumental Activities of Daily Living
- MMSE: Mini-mental status examination
- OSCE: Observed structured clinical examination
- ENT: Ear Nose Throat
- GDS: Geriatric Depression Scale
- OBGYN: Obstetrics and Gynecology
- CVA: Cerebrovascular Accident
- BPH: Benign Prostatic Hypertrophy



In line with the university policy, this new curriculum was then presented to the relevant hospital and academic committees. After their feedback and consensus, it was decided to implement this curriculum simultaneously in undergraduate curriculum years three, four and five. The first year of implementation was considered to be the pilot year. This would allow sufficient time to evaluate and modify the curricular content and strategies. The geriatric content conceived for the pre-clinical years (one and two) was to be built into the existing curriculum in the following year.

Curriculum implementation

The 3rd year of medical school at the Aga Khan University is the transition year with a shift from problem-based learning to patient based learning. The new curriculum was incorporated in the existing eight week Family Medicine rotation. In all, five groups of students rotate through Family Medicine for eight weeks through the year, with this class having a total of 89 students. The geriatric course objectives for this year were to familiarize students with history taking and physical examination and use of common geriatric assessment tools in elderly patients. In addition basic knowledge of aging physiology and pharmacology were also incorporated in this rotation.

Prior to the introduction of geriatrics in the third-year family medicine rotation, a three step faculty development initiative was taken. First, family medicine faculty (four in all) underwent a basic two hour training session on teaching a problem based geriatric history and physical examination method. Second, reading materials were provided as additional learning resources. These two steps were also reinforced by two one hour tutorial sessions for all those involved in teaching geriatrics. Additional faculty interested in geriatrics was also invited to attend these tutorials.

For students, two tutorial sessions were conducted to cover the basics of aging physiology and pharmacology. These were reinforced by two half day small group sessions in which problem based scenarios was used to practice history- taking in the context of aging physiology and pharmacology. Geriatric assessment and use of common geriatric tools was initially taught in a tutorial and then reinforced in two separate small group case based discussions. Opportunistic learning in terms of history taking and geriatric assessment was also provided to students in their clinical sessions during encounters with elderly patients throughout their eight week rotation.

Curricular Evaluation

From the pilot we decided to assess a small component of the new curriculum by evaluating the pre and post course knowledge of third-year students, and solicit their feedback on this curriculum to further refine the curricular content and strategies as necessary. Prior to this study, a review and approval was obtained from the Research Committee, Department of Family Medicine, Aga Khan University, Karachi.

Two study instruments were used to assess the course. Student knowledge was assessed via a single best option test which was given to all students as a pre-test prior to the introduction to geriatrics. The UCLA geriatric knowledge test, a validated questionnaire used in previous studies, was reviewed for pre-test development¹⁹. Keeping in line with the overall objectives of history taking and assessment skills for year three, a modified pretest consisting of ten items was designed. The questionnaire consisted of questions on aging demographics, aging physiology (cardiovascular and central nervous system), aging pharmacology, history taking, nutritional, functional, and gait assessment. The same questions were given (in a different order) to the students at the end of the geriatric sessions as a post test. Only those students that completed both the pretest and posttest were included in the study.



A course self-administered evaluation form was also distributed at the end of the rotation to all students. This form consisted of seven items related to course objectives rated on a forced choice format (a variant of the Likert scale) questionnaire with five choices ranging from 1 ('not achieved') (1), to 3 ('achieved'), to 5 ('outstandingly achieved'). The seven items assessed perceived attainment of objectives in areas of aging physiology, pharmacology, clinical presentation, history taking, psychosocial assessment, common geriatric assessment tools and student's ability to generate a problem list and empathize with a geriatric patient.

The second portion of the course evaluation contained items related to the quality and tools of teaching rated on a forced choice format with categories ranging from 1 ('unsatisfactory'), to 3 ('good'), to 5 ('excellent').

The overall quality of teaching was also included in the feedback form and a global rating for the overall course was also assessed. Space was also provided at the end of the form for additional comments. Student name on the course evaluation form was optional.

Analysis

The knowledge test was categorized into knowledge of aging demographics, aging physiology, aging pharmacology, geriatric history taking and knowledge of geriatric assessment and mean scores with standard deviations of simple total of the correct responses for each student were calculated. Comparison between pre and post- test were done by paired t-test. Items on the feedback forms were categorized into achievement of objectives and quality of teaching. In attainment of objectives, responses were categorized into two values: Not/partially achieved vs. achieved/achieved well/outstandingly achieved. Quality of teaching was grouped as unsatisfactory/ satisfactory vs. good/very good/excellent. The differences in feedback between those taking the course in the initial part of the academic year versus those coming later were compared with chi square. Analysis was done using SPSS version 16.

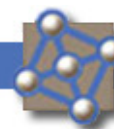
Results

The new geriatric curriculum was incorporated as a pilot program in 2008 (it took one year from need identification of geriatric teaching to implementation). A spiral curriculum with incremental objectives was designed and implemented in which the teaching and learning of geriatrics was built into already existing rotations. Content of teaching was distributed across disciplines of medicine, surgery, neurology, obstetrics and gynecology with the bulk of education in the family medicine rotations of years three and five (final year).

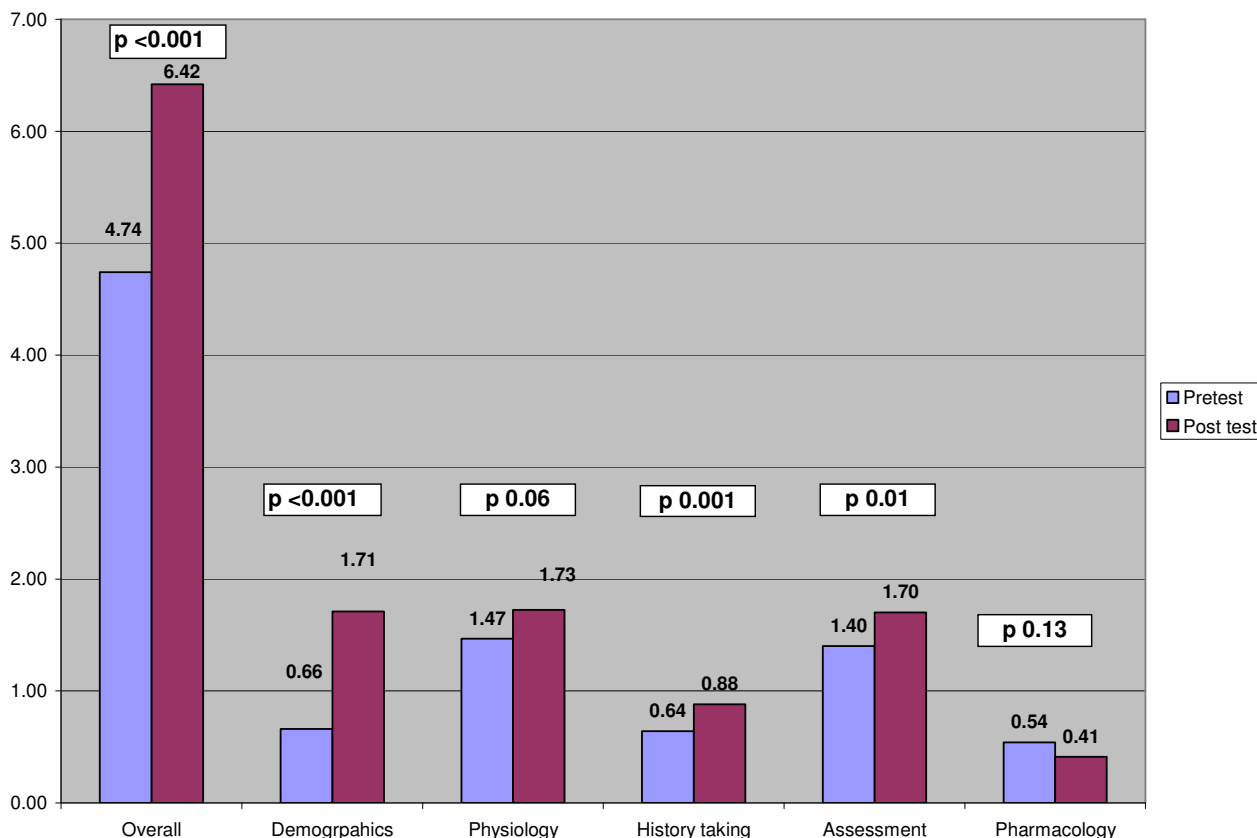
As planned, teaching began for students in curriculum years three, four, and five. Teaching and learning strategies were implemented within the time allocated. No extra curriculum time was needed to complete the required course objectives. Administrative staff were also able to accommodate the requirements of the new curriculum in terms of scheduling and logistics.

A total of 79 students took the knowledge pretest. Seventeen students completed only the pre-test or post-test and were not included in the final analysis. A total of 62 out of 79 pairs were then available for analysis.

Findings showed a significant improvement in mean scores for overall knowledge (pre-test 4.7 vs. post-test 6.4, p value of <0.001) (see Figure 1). Breakdown of knowledge scores showed a significant increase in understanding in areas of aging demographics (pre-test 0.7 vs. post-test 1.7 p value of <0.001), geriatric history taking (pre-test 0.64 vs. post-test 0.88, p 0.001) and geriatric



assessments (pre-test 1.4 vs. post-test 1.7, p value 0.01). No significant improvement was observed for aging physiology and aging pharmacology.



* Overall: pre test (min 1, max 9) and post test scores (min 3 max 9); Demographics: pre and post test (min 0, max 2); Physiology: pre and post test (min 0, max 3); History taking: pre and post test (min 0, max 1); Assessment: pre and post test (min 0, max 3); Pharmacology: pre and post test (min 0, max 1).

Figure 1: Comparison of Pre- and Post-test mean summary scores* of students' knowledge following introduction the new Geriatrics Curriculum

A total of 70 completed course feedback forms were analyzed. A strong majority (87%) of the students felt that the overall course objectives were achieved. Analysis of different aspects of the curriculum revealed perceived attainment of objectives in aging physiology (94%). psychosocial assessment (95%). geriatric assessment tools (82%). history taking (83%). and clinical presentations (89%). Almost all students (97%) felt that the course helped them improve empathy towards elderly patients.

All students were also satisfied with the quality of teaching with 90% rating it as good or higher. Most students (81%) rated the teaching strategies as satisfactory or higher. None of the students marked unsatisfactory for quality of teaching and the various components. Overall global rating for quality of the course was rated satisfactory or higher by 81% of students. Reasons for slightly



lower scores for teaching strategies were provided as open-ended comments written on the course evaluation form by certain students. Nearly all the comments were positive. One comment well highlighted the importance of this new course as in the words of a student, 'I am glad this was added to the regular curriculum. It is an easily overlooked part of medical care and is applicable to our role as medical students and at home for our grandparents . . .' A number of students made the specific suggestions for 'more hands-on experience with elderly patients,' and inclusion of simulated elderly patients in teaching geriatrics.

There was no significant difference in the course evaluation scores between those taking the course in the initial part of the academic year vs. those coming later. This was done to see if student knowledge improved as faculty became more adept at teaching this course.

Discussion

An initiative to introduce geriatrics in the undergraduate curriculum was undertaken by the medical college of the Aga Khan University in 2008. This was the first geriatric teaching program in a medical school of Pakistan. Indeed, no other such programs were identified in South Asia after an extensive literature search. We were successful in achieving our main objective, which was to develop and implement a geriatric curriculum for undergraduate medical students. This in itself was quite a challenge as all course content was to be incorporated into the current curriculum without taking away its existing components. In addition, no extra time was allocated from either vacation or student elective time. Another challenging aspect of this new course was that no additional funds or grants (either internal or external) were used to support its development and implementation. The major cost incurred was faculty time spent in planning and organizing this module. This is quite unlike the start of other geriatric programs^{8,20}.

The main reason for the rapid incorporation of geriatrics in our school's undergraduate medical curriculum was the strong recommendation from Liaison Committee for Medical Education. The speed of implementation of this curriculum was a result of the strong support from the academic leadership of the University, which provided impetus toward course development and department and faculty support. In addition, this course was also well received by most clinical and basic science departments, another key factor responsible for timely implementation.

We were also successful in fulfilling our second objective, which was to bring about an improvement in students' knowledge and attitudes in geriatrics. The knowledge scores improved considerably in students that attended the geriatrics course. This change was similar to improvement in student scores reported in other schools where geriatrics was introduced^{8,20,22}. Different areas of knowledge also showed improvement. This however may only reflect short term knowledge change. We cannot now know about students' long term retention of knowledge and understanding. We hope that the curriculum's spiral design will mitigate any attrition of this newly acquired knowledge through re-visitation of some of the topics in final year.

The overall course was well-received by students, and teaching strategies were considered good or better by a strong majority of students. There were a small number of students who rated the course unsatisfactory in terms of achievement of objectives with some students asking for more hands-on exposure to elderly patients. This was also reflected in the course evaluation scores where students rated achievement of objectives in history taking and assessments slightly lower than the other areas. Other students did not cite reasons for unsatisfactory scores. Feedback in small group discussions may have allowed for a more detailed feedback.



One of the important points in students' feedback was their report of an improvement in empathy towards elderly patients. This suggests that even a basic understanding and limited exposure to geriatrics may help mitigate ageism. However, the real confirmation of that change in attitude would be seen when these students interact with elderly patients, which we hope to evaluate in their final year.

An observation noted both by student and faculty was a lack of uniform exposure to geriatric patients and a limited number of faculty available to teach this new program. Similar faculty constraints have also been cited by other similar programs²³. We hope to overcome these limitations by exposing our students to more elderly patients either through exposure to inpatient, home and community based geriatric care which is currently in the developing phase. In addition, strengthen teaching via simulated patients through role play.

Limitations

The authors noted some limitations to the evaluation. Even though the response rate to the evaluation was good (78%) there were some students who didn't complete the post-test, therefore some bias may have been introduced due to non-participation. In addition the same questions were used for the pre- and post-test and that may have contaminated the post-test responses. Another limitation of the study was noted in the area of formal testing of the content taught as skill testing was not separately examined in the third-year.

The development of this course with no extra funds, extra student time or additional faculty was unique according to the literature. Its implementation demonstrated that appropriate need, academic leadership, faculty support, and reallocation of existing resources can be key elements in curriculum innovation and improvement. Clarity of course objectives and spiral format of the curriculum beginning in year one were perceived by the program's faculty to be the major strengths of the course.

Future Directions

We hope to incorporate the changes given to us in student feedback, especially in terms of the need for more patient exposure. Adding a community-based approach and strengthening assessment are future steps towards improving this curriculum. Training more faculty via distance programs, e-learning and obtaining internal/external funding are other options that may interest more faculty to participate and develop this curriculum. From a university perspective, future steps include introducing geriatrics in nursing and post-graduate training programs.

Conclusions

Geriatrics education was introduced in the undergraduate medical curriculum for the first time in Pakistan at the Aga Khan University. This was an important innovation in medical education in our region and also a step in the right direction in response to a growing elderly population. In addition this is also an example of how a low cost approach in a medical college of a developing country can be used to integrate a new module into an existing curriculum, which we hope would allow development of such modules in other regional medical colleges as well.



This course succeeded in improving geriatric knowledge of third-year students. In the future, we plan to work towards continual improvement and growth of geriatrics teaching at our university.

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