ASSESSMENT OF NEW TEACHING MODULE IN ORTHOPAEDICS

Rajesh Kumar Gupta[1], Aditya Gupta[2]

[1]Professor and HOD, Department of Orthopaedics, Acharya Sri Chander College of Medical Sciences & Hospital, Sidhra, Jammu, J & K
[2]Medical Officer, Acharya Sri Chander College of Medical Sciences & Hospital, Sidhra, Jammu, J & K.

ABSTRACT

BACKGROUND
The basic knowledge of musculoskeletal system is essential to the practice of orthopaedics at primary care level. This study is an effort at exploring a new teaching module for undergraduate orthopaedic students for better learning & patient care as primary care physician.

MATERIAL AND METHODS
A teaching module for two groups of final year MBBS students was developed that was focused, compact completed in a stipulated time frame. The module was implemented by means of didactic lectures, clinical bedside demonstration of physical examination & small group directed and / or student directed learning activities such as clinical case presentations. The validated multiple-choice questions were used for assessment before & after the implementation of the module.

RESULTS
The difference between pre-test & post-test scores in both the groups were statistically significant. Majority of the students felt that the new teaching module helped them in better understanding of orthopaedics.

CONCLUSIONS
The study findings pointed out that in order to bring about a change in the desired direction, there is a need for training with a well stipulated program to understand applied aspects of orthopaedics.

KEYWORDS
Assessment, Module, Orthopaedics.

BACKGROUND

Musculoskeletal disorders are common particularly in primary care & despite the high prevalence of musculoskeletal disorders seen by primary care physicians, numerous studies have demonstrated inadequacies of musculoskeletal education at multiple stages of medical education. In recognition of this deficiency at the beginning of the Bone & Joint decade (2000-2010) an appeal was made for reforms in medical education, yet after so many years there is little evidence of the improvement in education in musculoskeletal education.[1,2,3] Inadequate orthopaedic teaching have been reported from many parts of the world.[4,5]

Freedman and Bernstein (1998) developed a validated musculoskeletal examination to test health care providers in the basics of musculoskeletal disorders. They found that 82% of first-year postgraduate residents failed to demonstrate adequate basic cognitive understanding of musculoskeletal problems.[6]

To improve orthopaedic teaching, a study from Ireland by Vioreanu et al. (2013) highlighted the benefits & need for more interactive teaching of musculoskeletal medicine at undergraduate level.[7]

The most likely cause of deficiency at undergraduate level is lack of dedicated formal teaching in musculoskeletal medicine.

So, in my institution an undergraduate teaching module aimed at improving the competency of medical students in musculoskeletal medicine was designed & assessed.

MATERIALS AND METHODS

This study was conducted from 1-06-2016 to 30-06-2016 in the Department of Orthopaedics Acharya Shri Chander College of Medical Sciences & Hospital, Jammu. The study was conducted on 30 students of final year MBBS (Two batches of 15 students each) attending clinical posting in the Out-Patient Department of Orthopaedics. Each module was covered in 12 days' time.

The module was delivered by faculty from the department of orthopaedics. The faculty was sensitized regarding introduction of the new type of teaching module & its assessment.

A curriculum was developed in which basic orthopaedics topics on Knee, Hip & Spine region were covered by means of didactic lectures, clinical bedside demonstration of physical examination & small group directed and /or student directed learning activities such as clinical case presentations.

Two weeks prior to the start of module the students were called in the office chamber of the head of department of orthopaedics. The students were informed regarding the conduct & design of this new type of teaching module.

The lectures were made available on an internet-based teaching platform as PP presentation. The students were expected to have read the lectures prior to participating in the module. Each lecture was similarly structured so that relevant clinical anatomy, biomechanics & clinical examination were presented first followed by presentation on pathology & management of common musculoskeletal problems. Then bedside clinical examination was demonstrated to the students by the faculty & after that there was self-directed learning in the form of clinical case preparation & presentation by the students followed by feedback from students.

Three important different musculoskeletal regions were covered subsequently after every four days.

For first four days of module Knee region was covered:

Day	Activity	Time	Teaching methodology
1	Anatomy & Biomechanics of knee Examination of Knee Trauma Knee Arthritis Knee Deformity Knee	45 mins 45 mins 30 mins 30 mins 30 mins	Didactic teaching Didactic teaching Didactic teaching Didactic teaching Didactic teaching
2	Clinical examination of Knee	3 hours	Clinical examination of a knee patient (small group demonstration by the faculty)
3	Clinical examination of Knee	3 hours	Clinical examination of a knee patient (small group) by the students & case presentation to the faculty
4	Doubt clearing Feedback	2.5 hours 30 mins	Large group discussion with the faculty Feedback forms

Table 1. Module Implementation (Knee)

Almost similar teaching schedule was followed for Hip and Spine.

Day	Activity	Time	Teaching methodology
1	Anatomy & Biomechanics of Hip Examination of Hip Trauma Hip Arthritis Hip Deformity Hip	45 mins 45 mins 30 mins 30 min 30 mins	Didactic teaching Didactic teaching Didactic teaching Didactic teaching Didactic teaching
2	Clinical examination of Hip	3 hours	Clinical examination of a hip patient (small group demonstration by the faculty)
3	Clinical examination of Hip	3 hours	Clinical examination of a hip patient (small group) by the students) & case presentation to the faculty
4	Doubt clearing Feedback	2.5 hours 30 mins	Large group discussion with the faculty Feedback forms

Table 2. Module implementation (Hip)

Day	Activity	Time	Teaching Methodology
1	Anatomy & Biomechanics of Spine Examination of Spine Trauma Spine with paraplegia Infections Spine Deformity Spine & LBA	45 mins 45 mins 30 mins 30 mins 30 mins	Didactic teaching Didactic teaching Didactic teaching Didactic teaching Didactic teaching
2	Clinical examination of Spine	3 hours	Clinical examination of a spine patient (small group demonstration by the faculty)
3	Clinical examination of Spine	3 hours	Clinical examination of a spine patient (small group) by the students) & case presentation to the faculty
4	Doubt Clearing Feedback	2.5 hours 30 mins	Large group discussion with the faculty Feedback forms

Table 3. Module implementation (Spine)

The students were evaluated at the start of module by a set of validated multiple-choice questionnaires. There were total of 90 questions (30 each on the topics of knee, hip & spine). Each question carried one mark. The students who scored 50% marks were considered passed. At the end of

the module for one batch, post-test was again conducted with different set of questionnaires. This allows the student to identify and correct their deficiencies on different topics. All domains cognitive, affective & psychomotor were assessed.

Collection of Feedback- Students as well as faculty feedback questioner were prepared & validated.

Students' Feedback - The feedback was obtained from students after every topic of module, so in each module session three feedbacks were obtained regarding efficiency of the teaching module.

Faculty Feedback- The faculty feedback was obtained at the end of each module regarding effectiveness of this type of teaching module

RESULTS
Data Analysis
Data obtained after pre-test & post-test from both the groups were analysed with respect to the mean score using student t- test by statistical package for the social sciences(SPSS). Scores are reported as means & standard deviations(SD). Statistical significance was assessed at 5% level of significance.

The data from the feedback was also compiled and analysed by appropriate statistical analysis to evaluate the student's & faculty response.

Assessment of Teaching Module- The performance of students in both the groups in post-test was significantly higher than those in the pre-test (Table 4).

		Paired Differences			T	Df	p-value
		Mean	Std. Deviation	Std. Error Mean			
Group 1	PreModule1 - PostModule1	-10.86667	8.92722	2.30500	-4.714	14	.0001
Group 2	PreModule2 - PostModule2	-9.33333	5.67786	1.46602	-6.366	14	.0001

***Table 4. Showing Paired Difference Values in Terms of Mean, SD and SE***

As p-value is .0001 (<.05) so it is highly significant in both the cases.

The mean difference value in group 1 was (- 10.86667) & in group 2 (-9.33333). The p- value in both the groups was .0001 (< .05) so it is highly statistically significant. The same is depicted in the line graphs (1 & 2). So, the result demonstrated that after the module was delivered, students in both the groups gained significantly in terms of knowledge in orthopaedics.
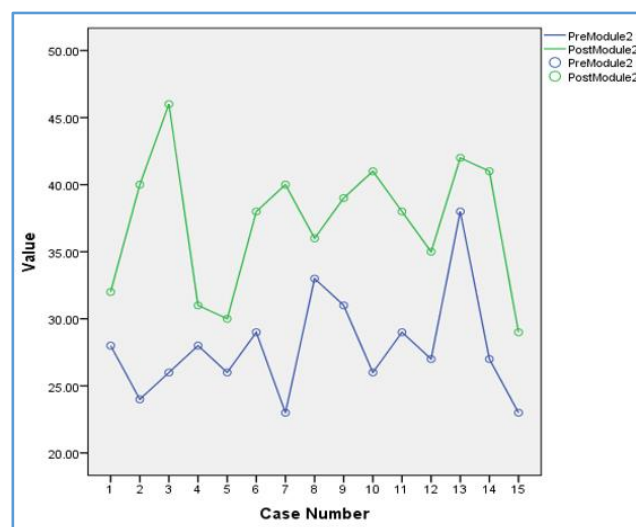
Overall 3.33% students passed the MCQ examination before the implementation of the module & 63.33% students passed the examination after the implementation of the module (Pie chart 1).
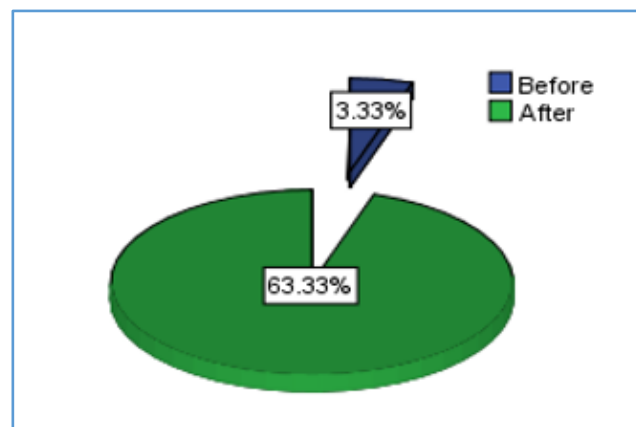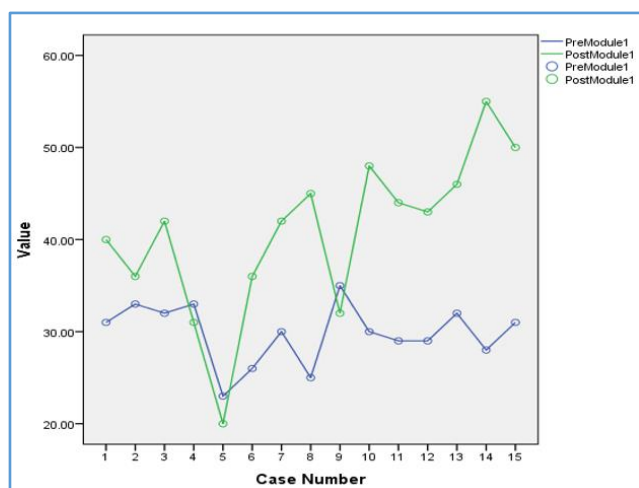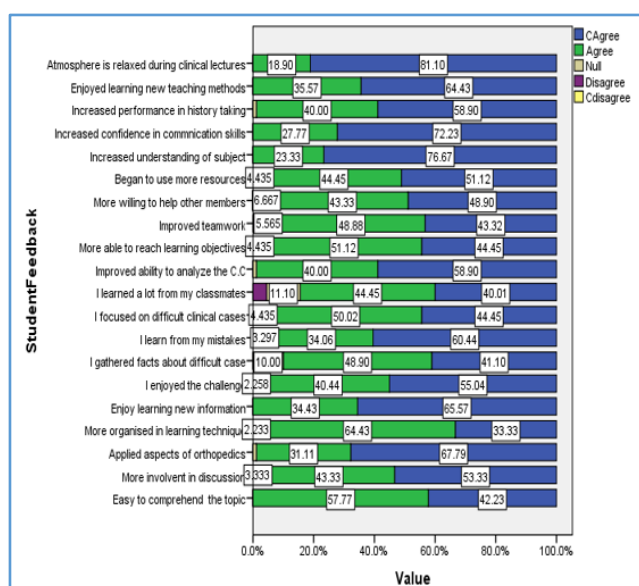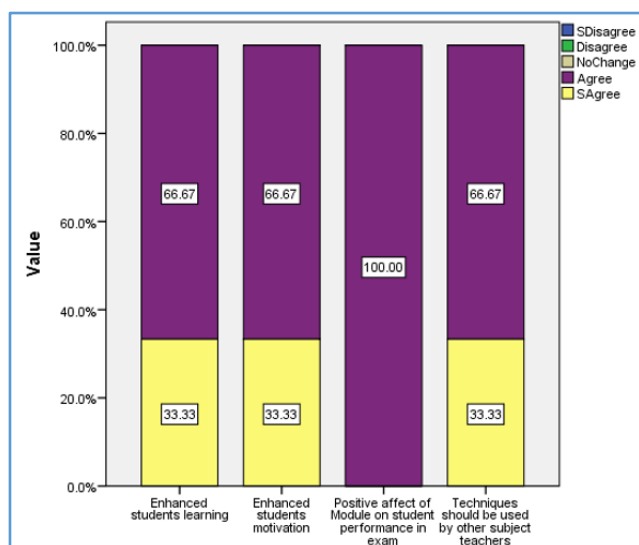

Pie Chart 1
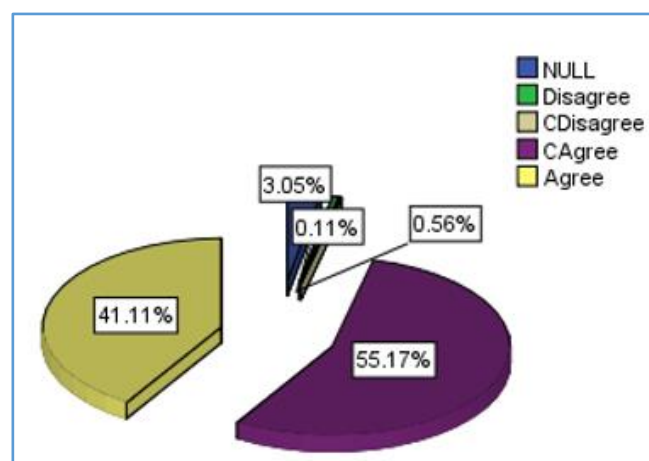
Pie Chart 2

Line Graph Group 1

Line Graph Group 2

Bar Graph 1

Bar Graph 2. Faculty Feedback

Response to Student Feedback Questionnaire- The feedback from the students as depicted in Bar Graph1 & Pie Chart 2 showed that 55% students completely agreed & 41% agreed with this type of teaching module. In 3% there

was no response, 0.55% disagree & 0.11% completely disagree with the module. So, most of the students were in favour of this new teaching module. Most of the students were of the view that the atmosphere was more relaxed during the lectures, they had increased understanding of the subject, increased confidence in communication skills, enhanced knowledge as far as applied aspect of orthopaedics is concerned & they enjoyed learning new teaching methods.

Faculty Feedback- All of the faculty were of the view that this teaching module enhanced students learning & motivation. They were also of the view that it will improve students' performance in examinations & this module should be tried in other subjects also (Bar graph 2).

DISCUSSION

Fundamental musculoskeletal knowledge is essential to clinical practice. Primary care physicians have been found to be deficient in orthopaedic knowledge and skills.[8,9]

While the widespread impact of musculoskeletal disease on society is indisputable, the relative inattention this subject has received in undergraduate education has been acknowledged.[10] A comprehensive review of the curricula indicated a marked discrepancy between the necessary skills and knowledge to treat patients with musculoskeletal disorders and the amount of time devoted to teaching these skills in Canadian medical schools. While 27.4% of primary care practice involved musculoskeletal disorders, only 2.26% of curriculum in a typical Canadian medical school was devoted to mandatory musculoskeletal education.[11] Almost half of American medical schools do not require formal clinical or basic musculoskeletal course prior to graduation.[12] In India, orthopaedic teaching constitutes only 3.7% of the total undergraduate medical curriculum.[13]

In an attempt to verify the adequacy of musculoskeletal training, Freidman and Bernstein developed a basic competency examination. Twenty-five short answer questions were framed keeping in mind the commonly occurring problems encountered in primary care. These included fractures and dislocations, low back pain and osteoarthritis. The examination also covered emergencies that required immediate referral to an orthopaedic surgeon as well as basic anatomical knowledge necessary for physical diagnosis. The questions were validated by chair persons of both orthopaedic and internal medicine residency programmes who recommended the mean passing grade of ≥73.1[14] the test was then administered to first-year postgraduates of different specialties. The mean score achieved was 59.6 ± 12%. Seventy residents (82%) failed to demonstrate basic competency in the examination 6. This examination was developed as a competency examination but was later relabelled as a "cognitive examination" as it tests more of quality of knowledge than skills.[5]

In a similar examination administered to 22 medical students in their last month of training at Barbados, West Indies, 82 percent of the students scored below the recommended passing score.[4]

A pass rate of 39% was reported when the same examination was administered to interns in Australia with a mean score of 69.4 ± 12.0%. The score improved to 77 ± 10.9% when general practitioners were examined (passing rate of 68%).[5]

In our study 3.33% students passed the MCQ examination before the implementation of the module & 63.33% students passed the examination after the implementation of the module, so there was marked improvement in pass percentage. Nevertheless, the inadequacy of musculoskeletal education stands exposed. The low scores could also be an indicator of the importance given to orthopaedics, as a subject in the medical curriculum. After the completion of module 76% of students felt that they had increased understanding of the subject & 72 % felt that they had increased confidence in communication skills.

In an almost similar study in Ireland, Vioreanu et al. (2013) designed, implemented and assessed an interactive musculoskeletal teaching module for fourth-year medical students. Over a 2-week period, students followed a programme of alternating lectures, interactive tutorials, case discussions, clinical examination and 'how to do' sessions using patients and clinical models. In the pre-course assessment, only 20 % of students achieved an overall pass rate. The pass rate increased to 85 % in post-course examination.[7]

In this study a new teaching module was tested. It was used to motivate the students to develop some interest in the orthopaedic subject and they reported feeling benefitted from this change. The learning style assessment after all may have some role as a motivational tool for better learning.

CONCLUSION

The fundamentals of basic knowledge are essential to clinical practice for primary care physicians. It was evident from the premodule knowledge that orthopaedic training was deficient at undergraduate MBBS level. The new teaching learning methodology & the assessment will definitely improve orthopaedic learning. An increasing burden of musculoskeletal diseases demands that future doctors should be well trained and competent in this field. It is the responsibility of medical institutions to strengthen undergraduate orthopaedic education to rectify the current deficiency. These changes will eventually translate into better patient care.

Limitations

Small sample was used for the assessment of effectiveness of newly developed study module. A larger student population would be necessary for more significant results. The examination may not have been totally flawless, but the

overall scores underline the fact that medical students are not adequately prepared in orthopaedics.

REFERENCES

[1] Lynch JR, Schmale GA, Schaad DC, et al. Important demographic variables impact the musculoskeletal knowledge & confidence of academic primary care physicians. J Bone Joint Surg Am 2000;88(7):1589-1595.

[2] Queally JM, Kiely PD, Shelly MJ, et al. Deficiencies in the education of musculoskeletal medicine in Ireland. Ir J Med Sci 2008;177(2):99-105.

[3] Bilderback K, Eggerstedt J, Sadasivan KK, et al. Design and implementation of a system-based course in musculoskeletal medicine for medical students. J Bone Joint Surg Am 2008;90(10):2292-2300.

[4] Jones JK. An evaluation of medical school education in musculoskeletal medicine at the university of West Indies, Barbados. West Indian Med J 2001;50(1):66-68.

[5] Broadhurst N. Measuring cognitive and clinical competency in orthopaedics. J Bone Joint Surg Am 2002;84-A(4):683-684.

[6] Freedman KB, Bernstein J. The adequacy of medical school education in musculoskeletal medicine. J Bone Joint Surg Am 1998;80(10):1421-1427.

[7] Vioreanu MH, O'Daly BJ, Shelly MJ, et al. Design, implementation and prospective evaluation of a new interactive musculoskeletal module for medical students in Ireland. Ir J Med Sci 2013;182(2):191-199.

[8] Fowler PJ, Regan WD. The patient with symptomatic chronic anterior cruciate ligament insufficiency: results of minimal arthroscopic surgery and rehabilitation. Am J Sports Med 1978;15(4):321-325.

[9] Ahern MJ, Soden M, Schultz D, et al. The musculo-skeletal examination: a neglected clinical skill. Aust New Z J Med 1991;21(3):303-306.

[10] Clawson DK, Jackson DW, Ostergaard DJ. It's past time to reform the musculoskeletal curriculum. Acad Med 2001;76(7):709-710.

[11] Pinney SJ, Regan WD. Educating medical students about musculoskeletal problems. Are community needs reflected in the curricula of Canadian medical schools? J Bone Joint Surg Am 200;83-A(9):1317-1320.

[12] DiCaprio MR, Covey A, Bernstein J. Curricular requirements for musculoskeletal medicine in American medical schools. J Bone Joint Surg Am 2003;85-A(3):565-567.

[13] Medical Council of India. Available from: http://www.mciindia.org/know/rules/rules_mbbs.htm.

[14] Matzkin E, Smith EL, Freccero D, et al. Adequacy of education in musculoskeletal medicine. J Bone Joint Surg Am 2005;87(2):310-314.