Who should teach rheumatology to medical students, a rheumatologist or an internist?

Patapong Towiwat [1*], Rawisut Deoisares [1], Nantana Choomchuay [2] and Supasit Pannarunothai [3]

[1] Department of Internal Medicine, Faculty of Medicine, Naresuan University, Phitsanulok, Thailand 65000

[2] Department of pathology , Faculty of Medicine, Srinakarinwinrot University, Thailand 10110

[3] Department of Community Medicine, Faculty of Medicine, Naresuan University, Phitsanulok, Thailand 65000

[*] Corresponding author. E-mail address: puidulian@hotmail.com

Abstract

Introduction: Rheumatology is listed as a special topic in the Thai medical competency assessment criteria of the 2012 national license examination. Lacking of rheumatologist in the affiliate medical centers may affect students' performances in rheumatology. This study compared medical students' knowledge scores on rheumatology examination between students taught by a rheumatologist and an internist, and surveyed students' opinions on teaching of rheumatology by a rheumatologist.

Methods: It was a non-randomized cross-sectional study in 6 medical education centers (MECs). The study was conducted with the sixth-year medical students (n=109). Rheumatologists in 3 MECs directly taught rheumatology to students while in 3 MECs the internists did so. Sixty multiple choice questions (MCQs) with one best response from 5 choices and a questionnaire, which surveyed students' opinions on teaching of rheumatology by a rheumatologist.

Results: The knowledge scores from the 60 MCQs revealed that students in the rheumatologist teaching group had slightly higher but not significantly different total scores than students in the internist teaching group (31.74 ± 5.47 vs. 30.49 ± 7.37, p value 0.32). The scores from "must know" items were also not significantly different between the two groups (20.57 ± 4.27 vs. 20.42 ± 5.92, p value 0.88). However, the scores on "should know" items of students from the rheumatologist teaching group had significantly higher scores than the internist teaching group (11.18 ± 2.15 vs. 10.06 ± 2.60, p value 0.03. Most medical students expressed the need to learn rheumatology from a rheumatologist with the expectation that a rheumatologist provides more emphasis on clinical and practical points than the internist does.

Conclusions: In the 3 MECs where the sixth-year medical students were taught by rheumatologists, a significant difference was found in "should know" knowledge of rheumatology but the "must know" and total scores were not significantly different. Most sixth-year medical students believed that teaching by rheumatologists would help them focus on clinical and practical points more than teaching by general internal medicine staff.

Keywords: Musculoskeletal, Undergraduate, Rheumatologist, Internist

Introduction

Musculoskeletal conditions affect hundreds of millions of people around the world (Dequeker, Rasker, & Woolf, 2000, pp. 715-729) In 1998, the prevalence of rheumatic disease in Thailand, reported by Chaiamnuay, Darmawan, Muirden, & Assawatanabodee was 0.04%-11.3%. The most rate of disease was osteoarthritis (Chaiamnuay, et al., 1998, pp. 1382-1387) Rheumatoid arthritis, osteoarthritis, and crystal arthritis were the three most common arthritic diseases seen in the largest tertiary referral centre in Singapore, and among autoimmune diseases, systemic lupus erythematosus had the highest proportion of referral cases. (Ng, et al., 2013, pp. 273-278)

The training of undergraduate medical students is to prepare medical graduates to work efficiently with

the health system; hence, the training should be integrated with the existing health system (Frenk, et al., 2010, pp. 1923-1958) The training of medical graduates at the Faculty of Medicine at Naresuan University (NU) has extensively involved large and small sized service hospitals of the Ministry of Public Health as the teaching venue for all three clinical years (called medical education centres or MECs) apart from the traditional teaching hospital (Naresuan University Hospital). Most of the clinical teachers at smaller MECs are experienced clinicians, such as internists who had been formally trained in the internal medicine specialty rather than being further trained as subspecialists (rheumatologists, cardiologists, electro-physio-cardiologist, etc.). On the contrary, most of the clinical teachers at larger MECs (including NUH) are subspecialists. Rheumatology is listed as a special topic in the Thai medical competency assessment criteria of the 2012 national license examination. Lacking of rheumatologist in the affiliate medical centers may affect students' performances in rheumatology.

After completing the 3 preclinical year programme at the NU campus, medical students are divided to continue their clinical study in 6 MECs. Three of the large MECs are able to run an independent lecture schedule according to the requirements set by the Thai medical competency assessment criteria for the national license 2012. The three smaller MECs run the same lecture schedule through teleconferencing facilities complementing their own bedside teaching and ward rounds.

Recently, many studies have shown that medical students, residents, or doctors who attended lectures or tutorials before clinical training have higher skills and knowledge than those who did not attend before clinical training (Lenhard, Moallem, Marrie, Becker, & Garland, 2008, pp. 288-293; Martin, Scalabrini, Rioux, & Xhignesse, 2003, pp. 437-440; Phisalprapa,

& Pandejpong, 2013, pp. S75-81; Ramakrishna, Higano, McDonald, & Schultz, 2005, pp. 212-218) In rheumatology, Humphrey-Murto, Smith, Touchie, & Wood found that students who were taught by rheumatology faculty had higher overall mean ratings than those taught by patient educators. The same study also showed that the rheumatology faculty-taught group had a higher pass rate than the patient educator taught group (Humphrey-Murto, et al., 2004, pp. 175-180) In contrast, studies by Raj, et al. and Smith, et al. found no differences in objective structured clinical examination (OSCE) scores between medical students who were taught by trained patient educators and those who were taught by rheumatology consultants and rheumatology trainees. (Raj, Badcock, Brown, Deighton, & O'Reilly, 2006, pp. 1404-1408; Smith, Henry-Edwards, Shanahan, & Ahern, 2000, pp. 1533-1537) Moreover, for effectiveness of workshop teaching, Sterrett, et al. found that after a 1-hour joint injection workshop both medical students and internal medicine residents significantly had a higher mean comfort level than before the workshop (Sterrett, et al., 2011, pp. 121-123)

To date, there has been no study that compares the rheumatologic knowledge of the sixth-year medical students taught through lectures and bedside teaching by a rheumatologist and by an internist. Therefore, the present study was aimed to compare the knowledge in rheumatology of the sixth-year medical students who were taught by rheumatologists with students taught by internist clinical teachers. This study also evaluated the students' opinions toward being taught rheumatology by a rheumatologist.

Methods

Study design and population

This study was a non-randomized cross-sectional study and was conducted with sixth-year medical students, who were going to graduate from the Doctor of Medicine program (M.D.) of the Faculty of Medicine, NU, in 2014. Study samples were 109 students from large MECs (NUH, Buddhachinaraj and Uttaradit MECs) and small MECs (Tak, Phrae and Phichit MECs). Medical students posted at small MECs were more mature than students at large MECs, as they had graduated with a health science degree with more than two years of experience before admission to preclinical years while medical students at large MECs were recruited from high school entrance examinations.

Instruments and application

This study employed two instruments for data collection: a set of multiple choice questions (MCQs) for testing knowledge and a questionnaire for surveying opinions towards knowledge delivery.

A set of 60 MCQs with one best response in 5 choices was used to assess students' knowledge scores. Of the 60 MCQs, 41 questions (68.3%) were classified as "must know" knowledge (such as crystal induced arthritis, septic arthritis, osteoarthritis, soft tissue rheumatism, etc.) and 19 (31.7%) classified as "should know" (such as systemic lupus erythematosus, rheumatoid arthritis, systemic sclerosis, idiopathic inflammatory myositis, spondyloarthropathy, etc.). Of these, 55 (91.7%) of the MCQs were application of knowledge questions and only 5 (8.3%) were recall questions. Internist staff of NUH set 60 MCQs based on content specified in the medical competency assessment criteria for the national license examination of the Thai Medical Council in 2012. The content included pathophysiology, differential diagnosis, specific diagnosis, medical treatment, and side effects of treatment in common rheumatological diseases. All MCQs were edited for the first round by a group of 3 internists and the second round by three

rheumatologists. The acceptability index (AI) was first determined by the internists who set the MCQs and the second round by three rheumatologists. Acceptability indices of "must know" and "should know" knowledge MCQs were 0.42 and 0.41, respectively, which meant that both sets of MCQs had good discriminatory power. The first and second rounds of question edits were also based on AI determined by the editors. The final version of MCQs reached a high content validity as the index of item-objective congruence (IOC) was 0.88. The final version of MCQs was then tested for reliability with 51 sixth-year medical students of another medical school; the Cronbach alpha was high at 0.99. (Cozby, 2009)

At the exit orientation session, the sixth-year medical students were asked to sit for a test with 60 MCQs in 90 minutes at NU.

Ethical procedure

The present study was approved by the research ethics committee of NU (9 January 2014). Written informed consent was obtained from all subjects.

Statistical analysis

All data were analysed by using a statistical package for social science software, SPSS statistic 17.0 for window. The statistics used were percentage, mean, standard deviation (SD), and student-T test. P-values of <0.05 were considered significant.

Result

This study included a total of 109 sixth-year medical students. They were divided into 2 groups. The first group contained 74 medical students from large MECs taught by rheumatologists and the second group contained 35 medical students from small MECs taught by internists. In our study's questionnaire, all the sixth-year medical students at

the 6 MECs revealed that during three clinical years they had been exposed to 1 to 5 bedside teachings at both inpatient and outpatient departments for common and uncommon rheumatologic diseases.

The knowledge scores from the 60 MCQs revealed that students in the rheumatologist teaching group had slightly higher but not significantly different total scores than students in the internist teaching group (31.74±5.47 vs. 30.49±7.37, p value 0.32). The scores from "must know" items were also not significantly different between the two groups (20.57±4.27 vs. 20.42±5.92, p value 0.88). However, the scores on "should know" items of students from the rheumatologist teaching group had significantly higher scores than the internist teaching group (11.18±2.15 vs. 10.06±2.60, p value 0.03 see Table 1). After the test, calculation of the difficulty index of the 60 MCQs revealed a difficulty index of 0.51, which was interpreted as appropriate (not too easy and not too difficult). (Nunnally, 1967) However, due to limitation of research design and ethic clearance, discriminant power of the 60 MCQs was not calculated.

Table 1 Total "must know" and "should know" scores by teaching group
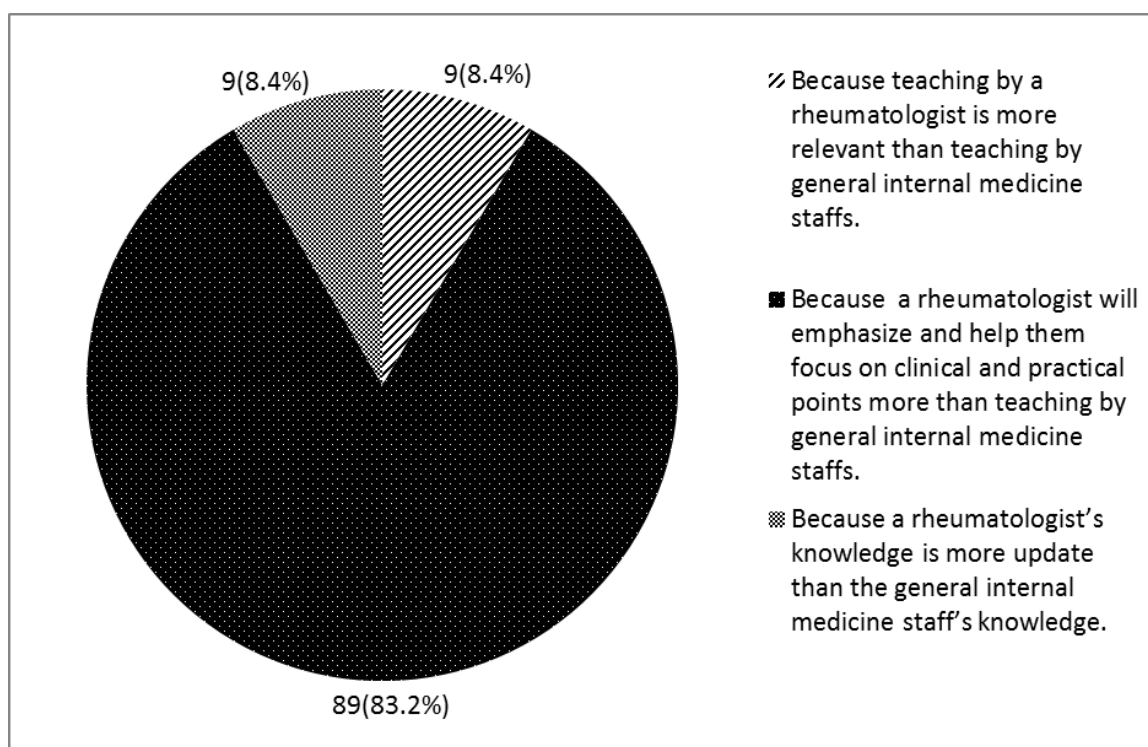
Teaching group Score	Rheumatologist teaching group (N=74)	Internist teaching group (N=35)	P value
Total score: mean±SD (min-max)	31.74±5.47 (21-46)	30.49±7.37 (13-45)	0.320
"Must know" score: mean±SD	20.57±4.27 (10-31)	20.42±5.92 (9-30)	0.884
"Should know" score: mean±SD	11.18±2.15 (7-16)	10.06±2.60 (4-15)	0.031

The questionnaire survey also asked the sixth-year medical students' opinions on whether the teaching should be by a subspecialty rheumatologist. The results are shown in Table 2 and Figure 1 The reasons that the sixth-year medical students felt they needed to be taught by a rheumatologist are that they believed that teaching by rheumatologists would put emphasis on and help them focus on clinical and practical points more than teaching by an internist.

Table 2 Opinions of the sixth-year medical students on whether they needed to be taught by a rheumatologist

Need for subspecialty teaching (%)	Rheumatologist teaching group (N=74)	Internist teaching group (N=35)
Need for subspecialty teaching (%)	97.30	100

Figure 1 The reasons of the sixth–year medical students for teaching by a subspecialty rheumatologist

Discussion

The training of medical graduates at NU using different sizes of service hospitals of MOPH as MECs has shown the strengths of the health system in integrating into the medical education system. The small MECs have more limited specialties of clinical teachers than large MECs, but with modern information technology such as teleconference for interactive lecturing along with the essentials of knowledge delivery including clinical skills coaching by generalist clinical teachers, they are appropriate for practicing after graduation.

Contextual characteristics of the 6 MECs and the medical students greatly influenced the study results. Medical students posted at small MECs are more mature than students at large MECs, as they have graduated with a health science degree with more than two years of experience before admission to preclinical years while medical students at large MECs are recruited from high school entrance

examinations. This difference may not affect their prior knowledge on rheumatology before study rheumatology in the sixth year. Although our study showed no significant difference in the total score and "must know" knowledge of the rheumatology score, the score in "should know" knowledge of the rheumatology score was significantly different between the two groups of the students. Because NUH, Uttaradit, and Buddhachinaraj MECs where there are rheumatologists are tertiary care hospitals, some rare cases or patients with complicated rheumatic diseases from primary or secondary care hospitals are referred to these hospitals. This would offer a chance for the sixth–year medical students who practiced in these tertiary care hospitals to gain more experience for learning and caring for these patients than the sixth–year medical students who practiced in secondary care hospitals. For the medical curriculum according to the Thai medical competency assessment criteria for the national license 2012, especially "must know" knowledge of rheumatology,

lectures and bedside teaching of rheumatology by general internal medicine staff are sufficient for minimal requirements in knowledge of rheumatology. However, to improve knowledge of some rheumatologic diseases, we suggest that in MECs where there are no rheumatologists some lecture topics of "should know" knowledge should be added in scheduled lectures or scheduled bedside teaching.

In our study, we also evaluated the sixth-year medical students' opinions for teaching by subspecialty rheumatologists. This result showed that in the 3 MECs where rheumatology was taught by internist teachers, all of the sixth-year medical students said they needed rheumatologists to give them lectures. On the contrary, a few sixth-year medical students in large MECs where rheumatology was taught by rheumatologists said they did not need rheumatologists for lectures or bedside teaching. Most sixth-year medical students believed that teaching by a rheumatologist would emphasize and help them focus on clinical and practical points more than teaching by general internal medicine staff. However, when evaluated on knowledge of rheumatology based on the Thai medical competency assessment criteria for the national license 2012, especially for the "total" and "must know" knowledge of the rheumatology score, there was no significant difference between the sixth-year medical students in the 6 MECs. Therefore, in our opinion, general internal medicine staff who teach rheumatology ought to build their confidence and ensure the sixth-year medical students that they are able to transfer the knowledge of rheumatology in the "must know" knowledge of rheumatology of the Thai medical competency assessment criteria for the national license.

There are several methods for assessment of medical knowledge such as MCQ, objective structured clinical examination (OSCE), modified assay question (MEQ), etc. Regarding differences in results with other studies, (Frenk, et al., 2010, pp. 1923-1958) Humphrey-Murto, et al., 2004, pp. 175-180; Lenhard, et al., 2008, pp. 288-293; Martin, et al., 2003, pp. 437-440; Phisalprapa, & Pandejpong, 2013, pp. S75-81; Raj, et al., 2006, pp. 1404-1408; Ramakrishna, et al., 2005, pp. 212-218; Smith, et al., 2000, pp. 1533-1537) this may be due to the fact that our study used only MCQs for assessing knowledge, which may not be enough for assessment of all skills and knowledge in rheumatology. In addition, our study used only the sixth-year medical students. It should also be noted that we asked why the sixth-year medical students required a rheumatologist but did not identify the reason for those students who did not report a need for a rheumatologist. These are limitations to our study. So, in the future, we suggest that other methods should be used for assessment of medical knowledge and evaluation of the reason why the sixth-year medical students do not require teaching by a subspecialty rheumatologist.

Conclusion

Our study concluded that in the 3 MECs where the sixth-year medical students were taught by subspecialty rheumatologists, a significant difference was only found in "should know" knowledge of rheumatology, which is part of the Thai medical competency assessment criteria for the national license 2012, and most sixth-year medical students believed that teaching by a rheumatologist would emphasize or help them focus on clinical and practical points more than teaching by general internal medicine staff. We suggest that in MECs where there is no rheumatologist some lecture topics

of "should know" knowledge should be added to the lecture schedule or bedside teaching for objective improvements in student knowledge in rheumatology.

References

Chaiamnuay, P., Darmawan, J., Muirden, K. D., & Assawatanabodee, P. (1998). Epidemiology of rheumatic disease in rural Thailand: a WHO-ILAR COPCORD study. Community Oriented Programme for the Control of Rheumatic Disease. *J Rheumatol, 25*(7), 1382-1387.

Cozby, P. C. (2009). *Methods in behavioral research* (10th ed.). Boston: McGraw-Hill Higher Education.

Dequeker, J., Rasker, J. J., & Woolf, A. D. (2000). Educational issues in rheumatology. *Baillieres Best Pract Res Clin Rheumatol, 14*(4), 715-729. doi: 10.1053 /berh.2000.0109S1521-6942(00)90109 -8 [pii]

Frenk, J., Chen, L., Bhutta, Z. A., Cohen, J., Crisp, N., & Evans, T., et al. (2010). Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *Lancet, 376*(9756), 1923-1958. doi: 10.1016/S0140-6736(10)61854-5S0140-6736(10) 61854-5 [pii]

Humphrey-Murto, S., Smith, C. D., Touchie, C., & Wood, T. C. (2004). Teaching the musculoskeletal examination: are patient educators as effective as rheumatology faculty? *Teach Learn Med, 16*(2), 175-180. doi: 10.1207/s15328015tlm1602_10

Lenhard, A., Moallem, M., Marrie, R. A., Becker, J., & Garland, A. (2008). An intervention to improve procedure education for internal medicine residents. *J Gen Intern Med, 23*(3), 288-293. doi: 10.1007/s11606-008-0513-4

Martin, M., Scalabrini, B., Rioux, A., & Xhignesse, M. A. (2003). Training fourth-year medical students in critical invasive skills improves subsequent patient safety. *Am Surg, 69*(5), 437-440.

Ng, X., Low, A. H., Chew, L. C., Chong, Y. Y., Fong, K. Y., & Lui, N. L., et al. (2013). Disease patterns of rheumatology outpatients seen in a tertiary hospital serving a multi-ethnic, urban Asian population in Singapore. *Int J Rheum Dis, 16*(3), 273-278. doi: 10.1111/1756-185x.12016

Nunnally, J. C. (1967). *Psychometric theory*. New York: McGraw-Hill.

Phisalprapa, P., & Pandejpong, D. (2013). Effect of ambulatory medicine tutorial on clinical performance of 5th year medical students. *J Med Assoc Thai, 96* (Suppl 2), S75-81.

Raj, N., Badcock, L. J., Brown, G. A., Deighton, C. M., & O'Reilly, S. C. (2006). Undergraduate musculoskeletal examination teaching by trained patient educators--a comparison with doctor-led teaching. *Rheumatology (Oxford), 45*(11), 1404-1408. doi: kel126 [pii]10.1093/rheumatology/kel126

Ramakrishna, G., Higano, S. T., McDonald, F. S., & Schultz, H. J. (2005). A curricular initiative for internal medicine residents to enhance proficiency in internal jugular central venous line placement. *Mayo Clin Proc, 80*(2), 212-218. doi: S0025-6196 (11)61508-5 [pii]10.4065/80.2.212

Smith, M. D., Henry-Edwards, S., Shanahan, E. M., & Ahern, M. J. (2000). Evaluation of patient partners in the teaching of the musculoskeletal examination. *J Rheumatol, 27*(6), 1533-1537.

Sterrett, A. G., Bateman, H., Guthrie, J., Rehman, A., Osting, V., & Carter, J. D., et al. (2011). Virtual rheumatology: using simulators and a formal workshop to teach medical students, internal medicine residents, and rheumatology subspecialty residents arthrocentesis. *J Clin Rheumatol, 17*(3), 121-123. doi: 10.1097/RHU.0b013e318214bb 54