

The Current State of Musculoskeletal Clinical Skills Teaching for Preclerkship Medical Students

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ABSTRACT. Objective. Musculoskeletal (MSK) complaints have high prevalence in primary care practice (12%–20% of visits), yet many trainees and physicians identify themselves as weak in MSK physical examination (PE) skills. As recruitment to MSK specialties lags behind retirement rates, there is a shortage of physicians able to effectively teach this subject. We investigated current practices of Canadian undergraduate medical programs regarding the nature, amount, and source of preclerkship MSK PE clinical skills teaching; and documented the frequency and extent that Patient Partners[®] in Arthritis (PP[®]IA) are used in this educational setting.

Methods. A 2-page self-administered electronic questionnaire combining open- and close-ended questions was developed and piloted. It was distributed by e-mail to all Canadian undergraduate associate-deans and to 16/17 undergraduate MSK course organizers.

Results. Supervised practice in small groups and the PP[®]IA are the most prevalent teaching methods. Objective structured clinical examinations are the most prevalent evaluation methods. The average number of hours devoted to teaching these skills is very small compared to the prevalence of MSK complaints in the population. Canadian schools' preclerkship MSK PE clinical skills teaching is heavily dependent on the contributions of non-MSK specialists.

Conclusion. The weak link in the Canadian MSK PE educational cycle appears to be the amount of time available for students' deliberate practice with expert feedback. There is a need for methods to evaluate and further develop MSK PE teaching by non-MSK specialists. This and increased use of PP[®]IA at the preclerkship level may provide students more time for practice with feedback. (First Release Oct 15 2008; *J Rheumatol* 2008;35:2419–26; doi:10.3899/jrheum.080308)

Key Indexing Terms:

UNDERGRADUATE MEDICAL EDUCATION TEACHING PHYSICAL EXAMINATION
MUSCULOSKELETAL SYSTEM QUESTIONNAIRES PATIENT EDUCATORS

Musculoskeletal (MSK) complaints have high prevalence in primary care practice (12%–20% of visits)^{1–3} and are a source of significant healthcare expenditures^{4,5} and morbidity⁶. Yet MSK examination is often neglected in clinical practice^{7–9}; further, a low comfort level among generalists and failure of recruitment to keep up with retirement rates in MSK special-

ties has led to a shortage of faculty able to teach this subject effectively^{10–14}.

Several reports have raised concerns regarding the inadequacy of MSK clinical skills teaching^{15–22}. Recent reports from the American Association of Medical Colleges (AAMC) and the Collège des Médecins du Québec have identified MSK clinical skills as areas of weakness in medical school curricula and in practicing physicians^{15,16}. These reports offer broad objectives and plans to correct this problem. In addition, consensus statements have come from the UK¹⁸, the USA¹⁹, and the International League Against Rheumatism¹⁷ underscoring the need for not only more general physical examination (PE) teaching, but specifically more MSK PE teaching in medical school. Finally, a recent study of student perspectives on MSK teaching found that both knowledge-based and clinical skills teaching were inadequate²³.

There have been attempts to identify barriers to PE teaching in medical schools^{24,25}. For example, one study held focus groups of rheumatologists, orthopedic surgeons, geriatricians, and general practitioners and identified 3 main barriers to MSK PE teaching: the lack of agreement on what to teach, the lack of confidence among non-MSK specialists, and poor communication between specialties²⁴. Another study used a survey of faculty to try to quantify clinical teaching commit-

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ments and the compensation received for this activity in an American medical school²⁵. They found 23% of faculty teaching time is spent teaching medical students, and overall, faculty were paid \$16/hour for this activity. Barriers to clinical skills teaching identified in this study included the large number of hours already committed to teaching and poor compensation for this activity.

One of the first published surveys of Canadian medical school MSK curricula³ found that 2.25% of Canadian undergraduate curriculum hours are devoted to MSK medicine. This compared unfavorably to the 13.7%–27.8% of primary care visits that predominantly related to MSK complaints, data they identified by literature review and by conducting their own survey of academic family physicians. In terms of the quality of the teaching, the program directors surveyed gave low ratings to the amount of time and resources devoted to MSK education. This survey did not specifically look at MSK PE teaching, but rather all MSK teaching.

A survey of all UK medical schools' rheumatology teaching conducted in 1997 showed that 18 of 23 (78%) of the schools taught clinical rheumatology at some time during their programs, with a mean module duration of 6 weeks²⁶. These schools used a variety of teaching methods. Although 3 schools reported using simulated patients, none used patient educators. Only 14 schools tested MSK clinical skills and of those, 12 used an objective structured clinical examination (OSCE) to do so.

Another study by these authors reported the results of a questionnaire of medical students' perceptions of the quality of a clinical skills course at one medical school²⁷. They showed a wide variety in the standards of MSK teaching across the 8 hospital sites, highlighting the difficulties relating to intra-institutional variability, let alone the difficulties in achieving inter-institutional consistency.

In attempts to improve the consistency of MSK teaching across medical schools and between countries, several groups have attempted to identify guidelines regarding appropriate MSK teaching^{15,16,18,20,28-31}. One UK group used focus groups of consultants from MSK specialties to determine which MSK PE skills should be included in undergraduate curricula²⁹. In a separate publication, these authors expanded on these focus groups and used the results to inform the development of a survey that was distributed nationally and subsequently identified 50 items they considered to be core regional MSK examination skills for medical students²⁸.

In terms of multinational and international initiatives, one group consulted MSK experts around the world to come up with core recommendations for learning outcomes of an undergraduate curriculum²⁰. The European League Against Rheumatism (EULAR) Standing Committee on Education and Training also published a comprehensive list of objectives, priorities, and minimum standards for a complete MSK undergraduate curriculum, although it is not clear how this list was derived³⁰.

Finally, the Alliance for the Canadian Arthritis Programs (ACAP) is a working group of physicians, allied health professionals, and members of the public who met to develop national Canadian guidelines for standards of arthritis care. Their report addresses issues far beyond MSK education, but by explicitly stating that, "all relevant health professionals must be able to perform a valid, standardized, age-appropriate musculoskeletal screening assessment"³², it plays an important role in shaping future Canadian undergraduate MSK curricula.

Our objectives were as follows; (1) to document the current practices of Canadian undergraduate medical programs regarding the nature, amount, and source of preclerkship MSK PE teaching; and (2) to document the frequency and extent to which Patient Partners[®] in Arthritis (PP[®]IA) are used in this educational setting. It is the authors' hope that this information will assist with the development of curricula that can be better aligned with population needs, teaching resources, and assessment methods.

MATERIALS AND METHODS

A 2-page self-administered questionnaire was developed to assess the nature of MSK didactic and clinical examination teaching and assessment for preclerkship medical students in Canada. It also addressed the extent to which the PP[®]IA program is used in the preclerkship curriculum at Canadian medical schools. The questionnaire included a combination of open- and closed-ended questions (Appendix).

The survey was piloted among members of the Centre for Medical Education at McGill University, Montreal. It was then distributed electronically in the late summer and fall of 2005 through an existing e-mail list-serve to all Canadian undergraduate associate-deans and subsequently to undergraduate MSK course organizers of Canadian universities. Reminder e-mails were sent in order to improve response rate.

Descriptive statistics were calculated and are presented below. Ethics approval was obtained as part of a larger research project evaluating the use of the PP[®]IA program at the preclerkship level from the McGill University Institutional Review Board.

RESULTS

Two of 17 undergraduate deans and 10 of 16 MSK medicine course organizers completed the questionnaire, for a total response rate of 12 of 17 medical schools. Of these 12 responders, 2 medical schools were Francophone and 10 were Anglophone.

On average, these medical schools reported 1–2 hours of large-group MSK PE demonstrations and 3–5 hours of small-group (defined as ≤ 10 students) demonstrations (Figure 1).

The average duration of small-group supervision of PE techniques was 3–5 hours, although it was not possible to differentiate from the survey whether this was in addition to or concurrent with the reported small-group demonstration time (Figure 2). Fifty-eight percent of the schools reported that their small-group MSK teaching was done either fully or in part by non-MSK specialists (Figure 3).

Eight of the 12 schools reported using the PP[®]IA program in preclerkship teaching of MSK PE skills. Of the schools that used the program, the average time devoted to PP[®]IA teach-

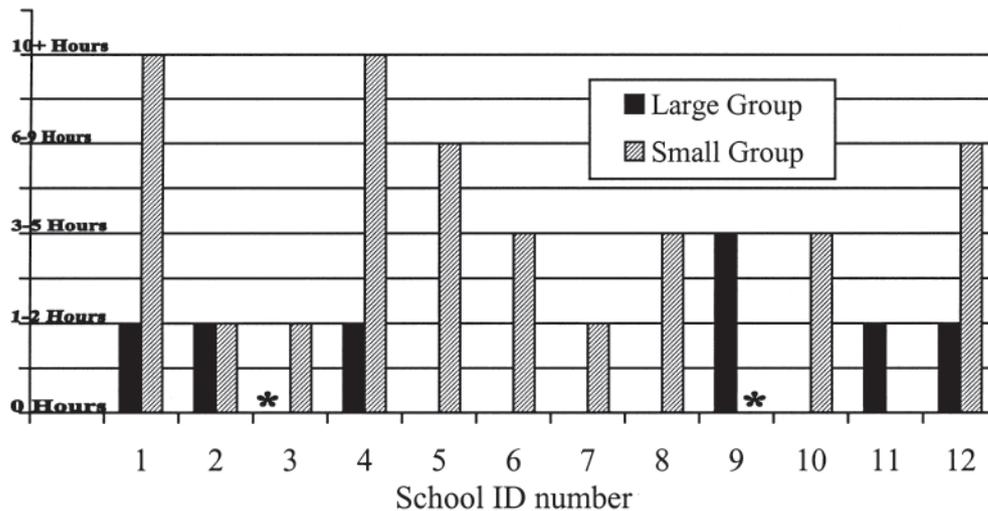


Figure 1. Musculoskeletal physical examination teaching, by school and group type. *Missing data.

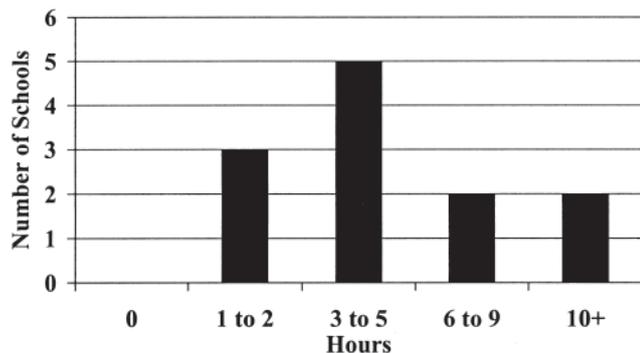


Figure 2. Small-group supervised practice of musculoskeletal physical examination.

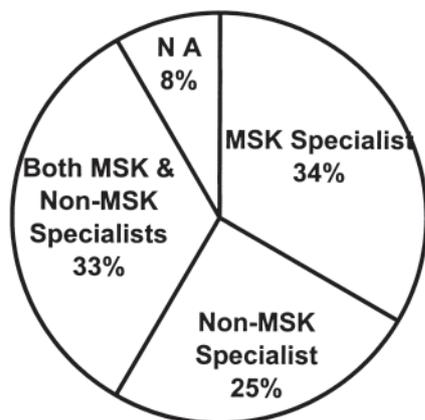


Figure 3. Source of student musculoskeletal physical examination teaching. NA: question not answered.

ing was 1–2 hours (Figure 4). Seven of the 12 schools also reported using the PP[®]IA program in the clerkship phase of the undergraduate curriculum.

Ten of the 12 schools provided narrative comments in the



Figure 4. Use of Patient Partners in Arthritis in preclerkship teaching.

open-ended section of the survey. Of these 10 schools, 3 indicated that the PP[®]IA sessions in their program addressed issues of communication during MSK clinical examination and 4 indicated that the PP[®]IA increased students' understanding of patients' feeling regarding MSK diseases. One school indicated its desire to introduce PP[®]IA at the undergraduate level should administrative resources become available. Six schools also indicated that they had PP[®]IA sessions in the clerkship phase of their programs, although one of these schools indicated that these sessions were optional. An additional school indicated that they were currently working on adding PP[®]IA to their clerkship training.

In contrast, Canadian medical schools spend an average of 3–5 hours of large-group lectures overviewing the theoretical aspects of major MSK diseases.

Ten of the 12 schools reported using OSCE to evaluate students' clinical examination skills, one school reported using one-on-one oral examinations of general PE skills with a pre-specified checklist, and one school reported not evaluating MSK clinical examination skills (Figure 5).

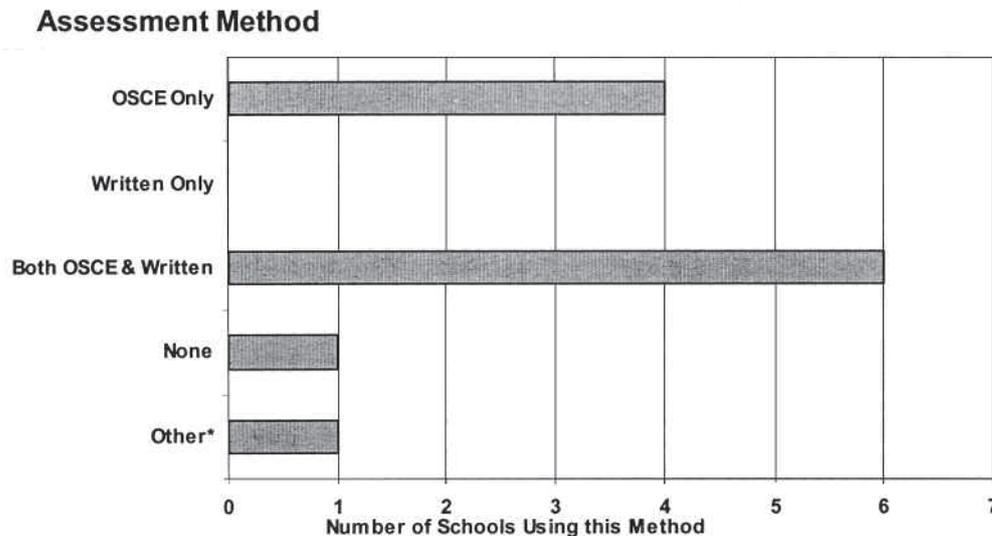


Figure 5. Methods to assess students' clinical examination skills. *Modified oral examination. OSCE: objective structured clinical examination.

DISCUSSION

We found that overall there was very little lecture and small-group time dedicated to MSK topics in the preclerkship years. For example, there was a mean of 3–5 hours of reported lecture time devoted to theoretical aspects of MSK disease. Further, a significant number of schools still use a large-group format to teach MSK PE skills, and 2 schools are exclusively using large groups for dedicated MSK PE teaching (Figure 1). Large-group teaching of PE skills neither offers the opportunity for students to attempt the skills discussed nor provides opportunities for feedback to students, and as such is generally less effective than small-group teaching. Fortunately, considering that evaluation drives learning, in Canadian medical schools, MSK PE skills are tested by OSCE in all but 2 schools. One of the 2 remaining schools uses a structured oral examination technique, although it is unclear if MSK skills are systematically tested at this school.

We found that despite general accreditation standards for Canadian medical schools, there are no specific accreditation requirements listed in regard to MSK PE teaching time. This has likely contributed to the variability of the programs in regard to the amount of time devoted to teaching and supervising medical students' MSK PE skills (Figure 2). Of interest, 3 schools report 6–9 hours or more of small-group MSK PE teaching. These schools are fortunate to be able to provide this amount of dedicated MSK PE teaching; however, the majority of medical schools cannot commit this amount of time and resources to ensure students have a good grasp of MSK PE skills.

Our data show that non-MSK physicians teach and supervise a significant amount of MSK PE sessions (Figure 3). However, previous research has shown that non-MSK specialists are often not very comfortable or proficient in MSK

PE skills. For example, 56% of family practitioners report medical school as the only source of formal instruction on the MSK system³³. With less than 3% of all curriculum hours in the Canadian medical school devoted to MSK education³, it is to be expected that 51% of family doctors report inadequate training in orthopedics³³, and 82% of recent medical school graduates failed to demonstrate basic competency in a validated examination of MSK medicine²². Considering the shortages of MSK-specialist faculty in Canada, the majority of schools likely would benefit from the integration of new teaching resources.

Several teaching resources have been proposed to aid the delivery of MSK PE programs. Possible examples include the use of Web-based self-study programs or standardized clinical instruction modules (SCIM). SCIM have been shown to be less resource-intensive but achieve similar outcomes compared to bedside teaching³⁴. Another suggestion has been to increase the use of existing patient-educator programs. Patient educators have been used successfully in teaching non-MSK subjects, for example, through the Pelvic Exam Program^{35–38}. The PP[®]IA program is a centrally coordinated, standardized national program that trains patient educators with arthritis to teach and evaluate MSK clinical examination skills. Patient educators participate in this program on a purely volunteer basis and undergo 100 hours of training, divided into 40 hours of seminars and 60 hours of home-study courses.

There have been several descriptive studies of PP[®]IA^{39–41} and 6 reported controlled trials of the influence of PP[®]IA interventions^{42–47}. The controlled studies have given mixed results in regard to quantitative assessments of the efficacy of PP[®]IA versus physician MSK PE teaching. Further, the study with the most rigorous methodology compared a 9-hour intervention of PP[®]IA versus rheumatologist-led small-group clin-

ical examination teaching⁴⁴. We find that this amount of small-group PE teaching is not representative of practices of the majority of Canadian medical schools with regard to either MSK-specialist or PP[®]IA teaching.

It is difficult to directly compare our results to the findings of Pinney and Regan's survey³ as we did not measure the total number of hours devoted to preclinical MSK teaching, and conversely, they did not break their results down into PE versus theoretical knowledge teaching. Yet both the Pinney and Regan study and our study highlight the marked underemphasis of MSK education in Canadian medical school curricula.

However, our results do add to Pinney and Regan's findings by obtaining more detailed information regarding the amount, style, and source of PE teaching. The matter of who is actually doing MSK PE teaching in Canadian medical schools has not been examined to date, and is of great practical importance considering the documented concerns regarding non-MSK specialists' confidence and expertise in MSK PE. Further, this study identifies how many schools are using existing MSK PE teaching resources such as the PP[®]IA program to supplement this aspect of the curriculum and to what extent these resources are used.

One survey of UK medical school rheumatology teaching practices did report the different teaching methods used, including the use of simulated patients²⁶. However, only 3 of their 23 schools reported using simulated patients and none reported using patient educators. This study also reported that only 14 of the 23 schools tested MSK clinical skills, with 12 of the 14 using an OSCE to do so. Fortunately, our evaluations of the Canadian system were more encouraging.

There is also a questionnaire study describing medical students' perceptions of the quality of a clinical skills course in the UK. It demonstrated wide variation in the standards of MSK teaching across 8 hospital sites of one medical school²⁷. Our findings confirm similar variations exist across Canadian medical schools.

Because we received survey responses from only 12 of the 17 (70.6%) schools contacted, there is a potential for selection bias in that schools that chose to respond may have been different from those that did not. Although this might challenge the internal validity of our results, it is probable that schools that responded would be more interested in furthering MSK PE teaching. We predict that nonresponding schools are likely to be on the lower end of the spectrum of time dedicated to MSK PE teaching. This potential bias may have led to results that understate rather than overstate the limitations of the amount of MSK PE teaching activities that occur in Canadian medical schools, further highlighting concerns regarding adequate MSK PE teaching.

In order to investigate this possibility, we reviewed Pinney's electronically published table of overall MSK curriculum content by Canadian medical schools³. Indeed, 3 of our 4 nonresponding schools had overall percentages of MSK curriculum content in the bottom quarter of overall MSK cur-

riculum hours. However, one of our nonresponders had reported a high percentage of overall MSK content. On closer examination, this school reported high amounts of mandatory MSK teaching during clerkship, but was actually in the bottom third for reported hours of preclinical MSK teaching.

As for representativeness of our sample, we did have fairly equal representation of Francophone and Anglophone schools, with 2 of the 3 (66.7%) Francophone schools responding, compared to 10 of 14 (71.4%) Anglophone schools, despite the fact that the survey was circulated only in English.

Another potential limitation of our study relates to the fact that respondents to our survey were primarily MSK course coordinators (10 of 12 respondents) rather than undergraduate associate deans (2 respondents). Pinney and Regan expressed similar difficulties finding a single person with adequate knowledge of MSK education at each institution³. However, although an undergraduate dean may have a better overall perspective of how the MSK course fits into the undergraduate curriculum, it is more likely that the course coordinators would have access to the detailed aspects of MSK PE teaching activities. It is unlikely that this feature would have significant influence on our results.

Methodologically, one may argue that a focused interview technique would have provided more in-depth information than a survey in regard to the detailed status of MSK PE teaching in Canada. However, the risk of the focused interview technique is that it may have led to a lower response rate, as it would have required a much greater time commitment on the part of respondents. This technique would be an appropriate next-step for a future study.

A final limitation to consider is the external validity of this study to other countries' MSK PE teaching situations. The Canadian medical licensing system requires that all medical graduates complete a rigorous clinical-skills OSCE as part of their licensing procedure. As such, Canadian medical schools tend to emphasize clinical skills, including PE skills, more than in other countries, where licensure is not dependent on success at a clinical skills examination. This may limit the generalizability of our results. This concern is partly supported by previous studies that reported only 78% of medical schools in the UK teach clinical MSK topics²⁶. However, reported prevalence rates of MSK diseases in primary care practice in the British and European studies are similar to those Canadian studies^{48,49}, and so these skills deserve similar representation in training programs for non-Canadian physicians.

Regardless of licensing examination requirements, MSK complaints represent a major source of primary care visits, healthcare expenditure, and overall population morbidity; yet teaching of the clinical skills to diagnose physical abnormalities of the MSK system in undergraduate medical school programs continues to be challenging. Our study brings better understanding of the current status of MSK teaching for pre-

clerkship medical students as a step toward appropriate targeting of existing MSK teaching initiatives and development of future teaching innovations.

Supervised practice in small groups and the Patient Partners in Arthritis are the most prevalent teaching methods.

OSCE examinations are the most prevalent evaluation methods. The average number of hours devoted to teaching these skills is very small compared to the prevalence of MSK complaints in the population. Canadian schools' preclerkship MSK PE clinical skills teaching is heavily dependent on the

Appendix. The self-administered questionnaire

Please help us understand what occurs at your institution in regards to **pre-clerkship musculoskeletal/rheumatologic/orthopedic (MSK) physical exam skills teaching.**

1. How many hours are spent in the following MSK teaching activities? NB: "Large Group" refers to ≥ 10 students.

| | 0 hours | 1-2 hours | 3-5 hours | 6-9 hours | 10+ hours |
|---|---------|-----------|-----------|-----------|-----------|
| Large group lectures over-viewing major MSK diseases? | | | | | |
| Large group illustration of MSK exam techniques (demonstration, video, online)? | | | | | |
| Large group exposure to MSK clinical reasoning skills? | | | | | |
| Small group illustration of MSK exam techniques (demonstration, video, online)? | | | | | |
| Small group exposure to MSK clinical reasoning skills? | | | | | |
| Supervision of students practicing MSK exam techniques? | | | | | |
| Small group sessions by National Patient Partners in Arthritis? | | | | | |

2. Who primarily provides the MSK teaching for the following activities:

NB: Non MSK Specialists = Internists/Surgeons/Family Practitioners
MSK Specialists = Rheumatologists/Orthopods/Physiatrists

| | Non MSK Specialist(s) | MSK Specialist(s) | Not Applicable |
|---|-----------------------|-------------------|----------------|
| Large group lectures over-viewing major MSK diseases? | | | |
| Large group illustration of MSK exam techniques (demonstration, video, online)? | | | |
| Large group exposure to MSK clinical reasoning skills? | | | |
| Small group illustration of MSK exam techniques (demonstration, video, online)? | | | |
| Small group exposure to MSK clinical reasoning skills? | | | |
| Supervision of students practicing MSK exam techniques? | | | |

3. Are the following issues addressed as they relate to MSK clinical exam skills for pre-clerkship students?

If yes, please describe how this is done below.

a. **Communication with patients?** ___ Yes ___ No
How? _____

b. **Understanding of patients' feelings?** ___ Yes ___ No
How? _____

c. **Student self-confidence with examination?** ___ Yes ___ No
How? _____

4. How are pre-clerkship students' MSK clinical examination skills tested? (Check any that apply)

___ OSCE ___ Written exam ___ Not Applicable
___ Oral exam ___ Other (please explain): _____

5. If MSK clinical skills teaching is not provided at the pre-clerkship level, please describe where it is taught.

6. Do you use the National Patient Partners in Arthritis in any other part of your undergraduate curriculum?

___ Yes ___ No If Yes, please describe: _____

7. Please describe any additional MSK clinical skills teaching interventions that you use that we have left out. _____

8. Additional comments: (Please attach additional pages if needed)

contributions of non-MSK specialists. The weak link in the Canadian MSK PE education cycle appears to be the amount of time available for deliberate student practice with expert feedback. There is a need for methods to evaluate and further develop MSK PE teaching by non-MSK specialists. This and increased use of PP[®]IA at the preclerkship level may provide students more time for practice with feedback.

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