A collaborative and comprehensive approach to women’s musculoskeletal health

Shukri H.A. Dualeh[1], Ellen K. Casey[2], Ana Núñez[3], Jeffrey D. Trojan[4], Mary K. Mulcahey[5]

Corresponding author: Dr Mary K. Mulcahey mary.mulcahey.md@gmail.com

Institution: 1. Drexel University College of Medicine, 2. Women's Sports Medicine Center, Physical Medicine & Rehabilitation, Hospital for Special Surgery, 3. Women's Health Education Program, National Center of Excellence of Women's Health, Drexel University College of Medicine, 4. Department of Orthopaedic Surgery, Tulane University School of Medicine, 5. Department of Orthopaedic Surgery, Tulane University School of Medicine

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Abstract

Background: The passage of Title IX precipitated a rise in the number of female athletes, an increase in musculoskeletal injuries observed in women, and an understanding that sex disparities in musculoskeletal injuries exist. Women's musculoskeletal health programs have been created to develop sex-specific strategies to prevent and treat musculoskeletal injuries in women. The purpose of this report is to highlight the formative process of a comprehensive Women's Musculoskeletal Health and Sports Medicine Program.

Methods: A half-day workshop of research presentations and networking was a preliminary step in the formative process of establishing a Women's Musculoskeletal Health and Sports Medicine Program. This workshop was aimed at facilitating communication and collaboration between subspecialties. Following the workshop, a survey was distributed to assess attendees’ impressions of the workshop.

Results: Nine of 11 (81.8%) respondents strongly agreed that the workshop was informative and 8 of 11 (72.7%) strongly agreed that they learned something new. Ten of 11 (90.9%) respondents strongly agreed that they would attend a similar workshop in the future.

Conclusions: An event focused on defining sex disparity in musculoskeletal injuries, highlighting current research in women's musculoskeletal health, and encouraging networking among health care providers seems to be an effective means of laying the groundwork for the development of a formal comprehensive musculoskeletal health and sports medicine program for women and girls.
Introduction

Since the passage of Title IX, there has been a rise in the number of female athletes, an increase in musculoskeletal (MSK) injuries observed in women, and an understanding that sex disparities in MSK injuries exist.1–4 For example, female athletes are at a 4-6 times greater risk to sustain an anterior cruciate ligament (ACL) injury than their male counterparts and sprain their ankle nearly twice as often.5–10 The realization that sex disparities affect MSK medicine and other subspecialties led the National Institutes of Health to mandate the study of sex differences in all areas of biomedical research.11 Sex disparity in MSK injury are likely due to a combination of factors, such as sex differences in anatomy, motor control, and sex hormones.12–16 Women are more likely to have a narrow intercondylar notch, which makes them more prone to ACL injury.17,18 It has also been hypothesized that the reproductive hormone estrogen may bind to specific receptors on fibroblasts in the ACL, leading to decreased production of collagen. Furthermore, decreased post-menopausal estrogen levels can lead to poor bone health and put women at a higher risk for osteoporotic hip fractures than men.5 Recent sex-based research has resulted in a better understanding of the differences in MSK conditions and injury patterns between men and women, but many questions remain.5,7,19 One strategy to continue developing sex-specific strategies to prevent and treat MSK injuries in women is to create programs dedicated to women's MSK health. These programs offer sex-specific care, provide education to medical trainees, and foster continued research. The implementation of such programs is anticipated to improve access to comprehensive and focused care for active women.7

Understanding the unique aspects of women's MSK health could potentially lead to more effective, personalized care.20,21 Along those lines, it is widely believed that the creation of an interdisciplinary medical team that can provide comprehensive treatment for a variety of MSK injuries and related conditions will increase the likelihood of obtaining optimal outcomes for female patients. The anticipated benefits of this approach include higher patient satisfaction, reduced cost, and improved outcomes.20 Many of the existing women's sports medicine programs promote this type of coordinated care. The Women's Sports Medicine Center at the Hospital for Special Surgery (HSS) in New York City, which was the first in the country, delivers comprehensive care through a team of orthopaedic surgeons, primary care and physiatric sports medicine physicians, exercise physiologists, sports dieticians, physical therapists, as well as a variety of other medical specialties.22 Other similar programs throughout the United States have also adopted an integrated approach to provide care centered on the unique aspects of female injuries and MSK health.22,23

The purpose of this report is to highlight the formative processes, including a preliminary workshop, and development of a comprehensive Women's Musculoskeletal Health and Sports Medicine Program. The goal of such a program is to facilitate communication and collaboration to achieve high caliber clinical care and support translational research through dynamic, diverse teams composed of health care providers paired with basic and clinical scientists with expertise in women's MSK health and function.

Methods

Phase I: Design and Implementation

As an initial step in the development of a comprehensive women's MSK health program, we designed a half-day workshop entitled ‘A Comprehensive and Collaborative Approach to Women's Musculoskeletal Health.’ Physicians
and other health care providers from multiple specialties, researchers, and students interested in this topic were invited to attend. The workshop was held on Friday, October 9th, 2015 as part of the Translational Medicine and Applied Biotechnology Workshop Presentation Series. The format included: 1) original research presentations, 2) networking, 3) a group discussion on formal Women’s MSK Health Program development, 4) a second round of presentations and 5) a final networking session.

Phase II: Presentations and Networking

After welcoming remarks and an overview of the goals for the workshop, six brief presentations of original research related to women’s MSK health were given by physicians and researchers at the primary author's institution. This was followed by a 40-minute facilitated networking session focused on identifying overlapping areas of clinical and research interest. During this event, the participants were asked to write their contact information and research/clinical interests on a card and post it on the board under seven different categories including: pain, psychological effects of injury, physical therapy, rehabilitation and exercise, nutrition, female athlete triad, therapeutic & diagnostic modalities, and injury prevention. We then incorporated seven additional presentations of original research related to women's MSK health. In the final 30 minutes of the workshop, participants engaged in a networking event to stimulate additional conversation around collaborative projects.

Phase III: Post Session Follow-up

The goals of the post session follow-up were not only to help stimulate new collaborations by identifying areas of overlapping clinical and research interests, but also to obtain feedback from workshop attendees. One month after the workshop, participants received a thank-you note and a document summarizing participants’ interests and active research based upon the seven sub-categories included in the facilitated networking event. Participants were also provided with a link to a feedback survey through Qualtrics (Provo, Utah), a commercial survey software available to all students and faculty at the primary author's institution. The survey consisted of questions related to demographics (e.g. attending physician, researcher, physical therapist, medical student or other) and workshop role (presenter or attendee). A combination of Likert scales ranging from strongly agree to strongly disagree and open text responses were incorporated as response options. Participants were asked about the structure, flow, content, and relevance of the workshop. We assessed overall efficacy of the workshop, choice of topics, the utility of the networking portion, logistics, and future plans. Additionally, participants were queried about new collaborations that developed as a result of the event. When asked about the most and least valuable parts of the workshop, respondents could select more than one option.   IRB approval was obtained to retrospectively review the data (ID 1704005365).

Results

Of the 38 attendees, 13 started the post workshop survey, but only 11 (28.9%) completed it. Respondents consisted of 2 attending physicians, 1 physical therapist, 1 medical student, 4 researchers, and the 5 people who selected ‘other’, who were in the fields of physical medicine and rehabilitation, psychology, school of biomedical engineering, science and health systems, nutrition sciences, and physical therapy and rehabilitation sciences. Six of 11 (54.5%) respondents that completed the survey presented research at the workshop.

Workshop

When asked if the workshop was informative, 9 of 11 (81.8%) respondents strongly agreed, while the other 2 (18.2%) somewhat agreed. Additionally, 8 of 11 respondents (72.7%) strongly agreed that they learned something
new from the workshop, while 3 (27.3%) only somewhat agreed with this comment [Figure 1]. Regarding the overall effectiveness of the workshop, respondents commented that the event exposed health professionals to ‘various ongoing projects at our institution’ and allowed ‘information-sharing across departments.’ Some respondents stated the event brought together researchers and health care professionals from a variety of backgrounds and attendees appreciated the overview of research projects focusing on women’s MSK health [Table 1].

**Topics and Speakers**

One hundred percent of the 11 respondents either strongly agreed (81.8%) or somewhat agreed (18.2%) to liking the choice of topics. Ten of 11 (90.9%) strongly agreed that the speakers were clear and well organized. All 11 respondents (100%) strongly agreed that the length of the talks was appropriate [Figure 2]. One of 11 (9.1%) noted that there was a good representation of departments and topics. Others stated that some of the speakers went into too much detail about their research and that there did not seem to be enough time set aside for questions [Table 1].

**Networking**

There was a broad range of opinions regarding the structure and the time allocated for the networking sessions. Five of 11 (45.5%) respondents strongly agreed that the time allocated for networking was about right. Three of 11 (27.3%) somewhat agreed, while another 2 (18.2%) neither agreed nor disagreed. Two of 11 (18.2%) respondents strongly agreed that the structure of the networking session was effective, 4 (36.4%) somewhat agreed, 4 (36.4%) neither agreed nor disagreed, and 1 (9.1%) somewhat disagreed. In the comment section, one respondent wanted more time devoted to the networking portion, while another respondent stated he/she wanted more facilitation [Table 1].

**Logistics**

All 11 respondents (100%) agreed that the time of day selected for the event (afternoon) worked well with their schedules. Eight of 11 (72.7%) respondents strongly agreed that the venue was appropriate, while 3 (27.3%) somewhat agreed. Three of 11 (27.3%) respondents commented that the space was somewhat cramped [Table 1].

**Collaborations and Referrals**

When asked if participants would attend a workshop on MSK health and sports medicine for the active female again in the future, 10 of 11 (90.9%) strongly agreed, while 1 (9.1%) somewhat agreed. Three of 11 (27.3%) respondents strongly agreed that they developed new collaborations as a result of the workshop, while 5 (45.5%) somewhat agreed, and 3 (27.3%) neither agreed nor disagreed. When asked if they plan on meeting with or contacting any new potential collaborators, 4 of 11 (36.4%) strongly agreed, 1 (9.1%) somewhat agreed, and 6 (54.5%) neither agreed nor disagreed. Most respondents (72.7%) neither agreed nor disagreed when asked if they have referred more patients to other workshop participants since the session. Regarding whether they received more referrals since the workshop, 1 of 11 (9.1%) strongly agreed, 2 (18.2%) somewhat agreed, 7 (63.6%) neither agreed nor disagreed and 1 (9.1%) somewhat disagreed [Figure 3].

**Most and Least Valuable Portions of Workshop and Future Topics**

Respondents were able to select more than one option when asked about the most and least valuable part(s) of the workshop, therefore, answers were not proportional to respondents and total responses exceeded 100%. Nine of 11 (81.8%) respondents indicated that the research presentations were the most valuable portion. Eight of 11 (72.7%) felt that meeting other providers and researchers interested in issues related to women’s MSK health was the most
valuable component. Of those who selected more than one response, seven respondents selected these two components of the workshop as the most valuable. Three of 11 (27.3%) selected ‘creating a referral network for physicians interested in women’s/girl’s MSK health’ and another 2 of 11 (18.2%) selected ‘facilitated networking event’ [Figure 4].

When asked about the least valuable part of the workshop, participants had the option to select either nothing or more than one option. Eight of 11 participants (72.7%) who completed the survey answered this question, none of which selected more than one response. Five of 8 (62.5%) stated that the facilitated networking event was the least valuable part of the workshop. Three of 8 (37.5%) respondents selected ‘other’ as the least valuable portion of the workshop [Figure 4]. Only 1 respondent utilized the free text option and stated it was unclear how the pain and painkiller addiction presentation related to women’s MSK health [Table 1]. The two other respondents who selected ‘other’ for this question did not elaborate further. Participants were also asked to list future topics of interest. Responses included reproductive issues and athletes, the older female athlete, and fitness with chronic injuries [Table 1].

**Discussion**

A comprehensive approach to women's MSK health is important given the sex differences that contribute to MSK injuries. The workshop ‘A Comprehensive and Collaborative Approach to Women's Musculoskeletal Health' held at the primary author's institution in the fall of 2015 served as the initial event in the development of a comprehensive women's MSK health and sports medicine program. This event brought together health care professionals, researchers, physical therapists, and medical students interested in Women's MSK health to facilitate new research collaborations and streamline clinical referrals for women's MSK health issues.

The workshop successfully raised important issues in Women's MSK health and further supported the value of a formal program. Attendees left with an understanding of the importance of a collaborative approach to Women's MSK health as evidenced by 100% of 11 survey respondents either strongly or somewhat agreeing that the workshop was informative, imparted new information, and stimulated attendees interest in participating in a future MSK health/sports medicine workshop. Comments from attendees supporting the overall effectiveness of the workshop included that ‘it was a great opportunity to learn about other projects at our institution’ and ‘to share information across departments’.

Researchers and clinicians from many fields have shown that an event such as a preliminary workshop is effective for addressing specific issues and setting the stage for implementing change. The Mayo Clinic hosted a 2-day workshop that brought together experts from around the country to investigate how to include sex and gender differences into medical educational and training programs. Attendees came to the consensus that sex and gender topics needed to be included in all fields of health care professional education and training, not just medicine. Similarly, Western University in London, Ontario, Canada held a 2-day workshop for clinicians and researchers to exchange information regarding strategies to improve pain and disability from injuries and to form a future research plan. A total of 13 core themes emerged from the workshop, including the complex nature of acute and chronic pain, recovery starting immediately following injury, and leveraging new technologies to solve old problems. Each of these was investigated further throughout the workshop and a comprehensive research agenda was formulated to aid in allocating research funding and resources. These examples demonstrate that an initial workshop can be a springboard to achieving a larger initiative. Also, integrating multiple fields allows providers to exchange knowledge, which can be used in the clinical setting and may therefore ultimately benefit patients.
The biggest area for improvement of our workshop centered around the networking event, with 62.5% of respondents identifying this as the least valuable portion of the day. This might have been due to a misunderstanding of the purpose of the activity, which was to connect individuals with similar interests and stimulate future post-workshop networking and collaboration. It is possible that some respondents expected a formal networking event that would allow in depth discussion of potential collaborations; however, time constraints prevented the event from being organized in this way. These changes could easily be implemented for a future women’s MSK health workshop. Clearly stating the objectives and allowing sufficient time for such an activity may encourage more participants to meet with or contact potential new collaborators following the workshop.

There are several limitations to this study. Although 38 people attended the event, only 11 completed the post-workshop survey. The data obtained, therefore, many not represent the opinion of all attendees. To encourage a higher response rate in the future, a paper survey can be distributed at the end of the workshop, so it can be completed in person. The respondent demographics were limited, as only two attending physicians responded. The post-workshop survey included questions regarding referral patterns, however, this would only apply to practicing physicians, so a majority of respondents answered, ‘neither agree nor disagree.’ Increasing the attendance and post-workshop survey responses of physicians in the future would allow for the proper interpretation of referral patterns. Also, it can take an extended period of time to see any changes in referral patterns; therefore, distributing a second survey to physicians several months after the workshop may yield more accurate data.

Overall, the half-day workshop entitled ‘A Comprehensive and Collaborative Approach to Women’s Musculoskeletal Health’ was well received. This workshop established the foundation for the development of a formal women’s MSK health program at the primary author’s institution. Since the workshop, a Steering Committee dedicated to supporting further development of a women’s MSK health and sports medicine program has been created. Additional progress to date includes establishing a consensus on the program name and mission and defining short- and long-term goals [Table 2]. To gain an understanding of the volume of female patients being treated for MSK health problems, information was collected on the number of women currently being treated for a defined set of five common MSK injuries/conditions including osteoarthritis, female athlete triad, ACL tear, stress fractures, and osteoporosis. Additionally, our electronic medical record system (Allscripts, Chicago, IL) was queried for the presence of the word ‘referral’ and each of the five MSK conditions listed above to establish a baseline of referral patterns. Similar data can be collected at future time points to determine if there is an increase in total volume of patients and referrals among women’s MSK health providers.

**Conclusion**

An event focused on defining sex disparity in MSK injuries, highlighting current research in women’s MSK health, and encouraging networking among health care providers is an effective means of laying the groundwork for the development of a formal comprehensive MSK health and sports medicine program for women and girls. We encourage other institutions interested in creating such a program to begin by designing a workshop or symposium dedicated to the topic to gain support and momentum for this initiative.

**Take Home Messages**
Notes On Contributors

Shukri H.A. Dualeh is a medical student at Drexel University College of Medicine.

Ellen K. Casey is an associate attending physiatrist at the Hospital for Special Surgery and the Women's Sports Medicine Center.

Ana Núñez is the associate dean for diversity, equity and inclusion at Drexel University College of Medicine. She is also the director of the Center of Excellence in Women's Health and director of the Women's Health Education Program at Drexel University College of Medicine.

Jeffrey D. Trojan is a research assistant in the Department of Orthopaedic Surgery at Tulane University School of Medicine.

Mary K. Mulcahey is an associate professor and the director of the Women's Sports Medicine Program in the Department of Orthopaedic Surgery at Tulane University School of Medicine.

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Appendices

| TABLE 1: Post-Workshop Survey Comments |
|----------------------------------------|
| Section                                 | Comments                                                                 |
| Overall Effectiveness of Workshop       | • I thought it was effective in that it was good for networking and information sharing across departments.  |
|                                         | • Informative and good networking opportunity.                           |
|                                         | • Very helpful and interesting to learn about the various ongoing projects at our institution. |
|                                         | • It was effective in showing the breadth of interests and projects at Drexel. Stronger focus might increase depth of information shared, but that wasn't the goal, I assume. |
|                                         | • Well done. Kept to time and provided a lot of information.              |
|                                         | • Enjoyed it and was able to be a co-investigator on an internal grant just submitted! Thanks! |
|                                         | • The workshop provided an excellent overview of research areas for women's health in orthopedics. |
|                                         | • Effective in bringing together a diverse group of clinicians and researchers. |
|                                         | • Brought together physicians, clinicians, and researchers interested in women's MSK health - very effective. |
### Topics & Speakers
- It was very interesting information, and a good opportunity to see what other professionals at our institution are working on with respect to women's musculoskeletal health.
- Nice representation of varied departments and breadth of topics. I was very interested in most topics although some speakers went into more details of their research than others.
- I would have preferred that the talk stay on schedule. It seemed that there was not enough time built in for questions.

### Networking
- It was a good idea in theory, but I'm not sure we actually followed it by talking to others based on interests that we put on the post-its. I mainly just walked around and introduced myself to the people I wanted to talk to.
- I don't remember the networking part.
- Would have liked more time for networking at the end.
- Would encourage more facilitation for the networking sessions and/or challenge the groups to brainstorm 3-5 research topics or types of patients that might be shared b/w departments.
- Disorganized, no clear explanation of goals for the event.

### Logistics
- It was very nice, and the food was good!
- Room could have been larger.
- The room was a little cramped.
- Would have been nice to have a separate room for the portion with the sticky notes. The space was a bit cramped, and didn't seem to allow for people to exchange their ideas.

### If you would like to have a brainstorming session on the area related to your research, please list topic here.
- I would like to pursue the institute idea.

### The least valuable part was
- I was interested in the presentation on pain and painkiller addiction, but it was unclear how it related to women's MSK health.

### What topics would you recommend that we add in the future?
- It might be more useful from a clinical standpoint if there was a more specific theme. While it was interesting to see what the many varied presenters were interested in and were researching, it was scattered and therefore not all that relevant from a clinical standpoint.
- Reproductive issues and athletes.
- The older female athlete.
- Fitness with chronic injuries.

### Table 1: Post-Workshop Survey Comments

### Table 2: Short and Long term goals of the Women’s Musculoskeletal Health/Sports Medicine Program
Table 2: Short and Long-Term Goals

| Short term Goals                                                                 |
|---------------------------------------------------------------------------------|
| • Define mission: bring together physicians and researchers with an interest in women’s and girl’s health to streamline referrals, stimulate research collaboration, and provide a comprehensive approach to musculoskeletal health. |
| • Seed grant opportunities for new collaborative projects.                      |
| • Acquire funding for centralized scheduling system, research coordinator, way to track referrals, and administrative support. |
| • Support from college of medicine, public health, college of engineering for seed money to support the collaborations. |
| • Hire health care workers interested in Women’s MSK health.                    |
| • Increase educational exposure of health care workers through grand rounds specific to sports medicine and MSK health topics (ex: osteoporotic fractures, ACL tears in girls, etc). |
| • Increase education exposure in the community by using more common language, holding symposiums, and targeting potential patients. Follow up with surveys. |
| • Create a database warehouse.                                                  |

| Long term Goals                                                                 |
|--------------------------------------------------------------------------------|
| • Sustain research collaborations.                                              |
| • Seed grant opportunities for new collaborative projects.                      |
| • Monitor progress with annual reports, follow-up funding applied.             |
| • Extramural funding.                                                          |
| • Increase referrals by 5% over 3 years. Data warehouse inquiry will provide baseline. |
| • Increase total volume of activity, patients seen, and Relative Value Units (RVUs) generated by 5% over 3 years. |

Figure 1. Overall Effectiveness of the Workshop
Figure 2. Topics and Speakers

Figure 3. Result of Attending Workshop
Figure 4. Most and Least Valuable Portions of the Workshop

Declaration of Interest

The author has declared that there are no conflicts of interest.