**SUPPLEMENTAL DIGITAL CONTENT**

**Supplementary Table 4. MSKUS Survey Sent to PM&R Program Directors**

|  |  |
| --- | --- |
| 1. How many residents do you admit to your program each year? | \_\_ |
| 2. How many faculty have certifications in each subspecialty? | \_\_ Brain injury medicine\_\_ Hospice and palliative care\_\_ Neuromuscular medicine\_\_ Pain medicine\_\_ Pediatric rehabilitation medicine\_\_ Spinal cord injury medicine\_\_ Sports medicine |
| 3. Do you include ultrasound as a formal part of your residency training program?  | ☐ No - **Please skip to question 11**☐ Yes - **Please continue to question 4** |
| 4. Which of the following Methods of Teaching ultrasound are used in your training program? (Please select all that apply) | ☐ Didactic lectures☐ Practice sessions with simulators or models☐ Bedside ultrasound exams on patients☐ Facilitated proctor guidance☐ Informal teaching to residents who seek instruction☐ On-line independent study learning modules☐ Other (please specify): |
| **Content of Ultrasound Curriculum:** Please indicate which of the following components are included in your formal ultrasound curriculum. |
| 5. Knobology: | Yes | No | I don’t know |
|  Explaining probe selection  | ☐ | ☐ | ☐ |
|  Obtaining orthogonal views | ☐ | ☐ | ☐ |
|  Adjusting focus  | ☐ | ☐ | ☐ |
|  Adjusting depth | ☐ | ☐ | ☐ |
|  Adjusting gain | ☐ | ☐ | ☐ |
|  Using Doppler | ☐ | ☐ | ☐ |
|  Entering patient information | ☐ | ☐ | ☐ |
|  Measuring length/measuring a linear structure  | ☐ | ☐ | ☐ |
|  Measuring diameter | ☐ | ☐ | ☐ |
|  Measuring area  | ☐ | ☐ | ☐ |
|  Inserting labels on an image | ☐ | ☐ | ☐ |
|  Saving images | ☐ | ☐ | ☐ |
| 6. Ultrasound Physics:  | Yes | No | I don’t know |
|  Physics of US waves & image formation | ☐ | ☐ | ☐ |
|  Relationship between frequency, resolution & depth | ☐ | ☐ | ☐ |
| 7. Musculoskeletal Ultrasound: Using US to evaluate … | Yes | No | I don’t know |
|  Muscles, tendons, ligaments (tissue characteristics) | ☐ | ☐ | ☐ |
|  Shoulder joint/shoulder pain | ☐ | ☐ | ☐ |
|  Elbow joint | ☐ | ☐ | ☐ |
|  Wrist joint | ☐ | ☐ | ☐ |
|  Hip joint | ☐ | ☐ | ☐ |
|  Knee joint | ☐ | ☐ | ☐ |
|  Ankle joint | ☐ | ☐ | ☐ |
|  Other joints (Please specify): |  |
| 8. Peripheral Nerve Ultrasound: Using US to evaluate …  | Yes | No | I don’t know |
|  Median nerve | ☐ | ☐ | ☐ |
|  Ulnar nerve | ☐ | ☐ | ☐ |
|  Radial nerve | ☐ | ☐ | ☐ |
|  Axillary nerve | ☐ | ☐ | ☐ |
|  Musculocutaneous nerve | ☐ | ☐ | ☐ |
|  Brachial plexus | ☐ | ☐ | ☐ |
|  Phrenic nerve | ☐ | ☐ | ☐ |
|  Sciatic nerve | ☐ | ☐ | ☐ |
|  Tibial nerve | ☐ | ☐ | ☐ |
|  Peroneal (fibular) nerve | ☐ | ☐ | ☐ |
|  Pudendal nerve | ☐ | ☐ | ☐ |
|  Other nerves (Please specify):  |  |
| 9. Interventional Ultrasound Procedures: | Yes | No | I don’t know |
|  Joint injection/aspiration | ☐ | ☐ | ☐ |
|  Perineural injection | ☐ | ☐ | ☐ |
|  Other US-guided procedures (Please specify): |  |
| 10. Is ultrasound competency part of your residency graduation requirements?  | ☐ Yes ☐ No |
| **Procedural Skills in Your Curriculum** |
| 11. For each clinical skill, please circle the number that describes whether and how the skill is taught in your program.  | 0= Not taught at all1= Taught, but without US-guided technique2= Taught with US=guided technique <50% of the time3= Taught with US-Guided technique about 50% of the time4= Taught with US-Guided technique > 50% of the time5= Taught with US-Guided technique all of the time |
|  Joint injection/aspiration | 0 | 1 | 2 | 3 | 4 | 5 |
|  Nerve block | 0 | 1 | 2 | 3 | 4 | 5 |
|  Perineural steroid injection | 0 | 1 | 2 | 3 | 4 | 5 |
|  Botox injection | 0 | 1 | 2 | 3 | 4 | 5 |
|  Baclofen pump refill | 0 | 1 | 2 | 3 | 4 | 5 |
|  Paravertebral injections | 0 | 1 | 2 | 3 | 4 | 5 |
|  Needle placement for EMG  | 0 | 1 | 2 | 3 | 4 | 5 |
|  Other percutaneous procedures | 0 | 1 | 2 | 3 | 4 | 5 |
| 12. Please categorize each procedure below as to how it is treated in your residency program. Select one answer for each procedure.  | Required: A **REQUIRED** procedure is one that all residents must be able to perform independently by graduation. | Optional: An **OPTIONAL** procedure is one that residents have the opportunity to learn the procedure by graduation.  | Not Taught: A procedure is **NOT TAUGHT** if there are no opportunities for residents to learn the procedure by graduation. |
|  Perform ultrasound-guided joint injection or joint aspiration | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided nerve block | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided steroid Injection around nerve | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided botox injection | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided baclofen pump refill | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided paravertebral injections | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided needle placement for EMG | ☐ | ☐ | ☐ |
|  Perform other ultrasound-guided percutaneous procedures  | ☐ | ☐ | ☐ |
| 13. Please estimate: About how many US scans of each type listed below are performed during residency training by residents in your program?  |  |
|  Number of musculoskeletal (muscle or joint) scans: | \_\_ |
|  Number of neuromuscular (peripheral nerve) scans: | \_\_ |
|  Number of ultrasound-guided procedures: | \_\_ |
| 14. Please estimate: About how many of your PM&R faculty directly supervise residents in performing neuromuscular US, musculoskeletal US or US-guided procedures on patients?  | \_\_ |
| 15. Where are ultrasound machines available for resident use? (Please select all that apply) | ☐ No ultrasound equipment is available☐ PM&R inpatient service☐ PM&R outpatient service☐ Bedside ultrasound exams on patients☐ Sports medicine outpatient clinic☐ Simulation center or clinical skills lab☐ Other (Please specify):  |
| **Opinions about including Ultrasound in the PM&R Scope of Practice** |
| 16. For each ultrasound procedure listed, please indicate your level of agreement as to whether the procedure belongs within the scope of practice during a three-year physical medicine residency training program (PGY2-PGY4).  | Strongly Disagree  | Disagree | Disagree/Agree about equally | Agree | Strongly Agree |
|  Perform ultrasound-guided joint injection or joint aspiration | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided nerve block | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided steroid Injection around nerve | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided botox injection | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided baclofen pump refill | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided paravertebral injections | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Perform ultrasound-guided needle placement for EMG | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Perform other ultrasound-guided percutaneous procedures  | ☐ | ☐ | ☐ | ☐ | ☐ |
| **Barriers to integrating ultrasound (US) in the PM&R residency training program** |
| 17. Please *rank* the following challenges to integrating ultrasound into the PM&R residency curriculum. Make “1” the most significant barrier and “8” the least significant barrier. |
|  Inadequate knowledge & experience of preceptors  | \_\_ |
|  Inadequate numbers of patients requiring ultrasound scans  | \_\_ |
|  Lack of availability of ultrasound equipment  | \_\_ |
|  Inadequate literature defining what should be taught to PM&R residents  | \_\_ |
|  Inadequate credentialing tools for PM&R physicians to perform US scans | \_\_ |
|  Inadequate reimbursement for scans performed by PM&R physicians | \_\_ |
|  Inadequate institutional support for US scans | \_\_ |
|  Lack of PM&R resident interest  | \_\_ |
|  |  |
| **Responder Characteristics** |
| 18. Have you ever personally conducted an ultrasound study in a clinical setting on a patient? | ☐ Yes ☐ No |
| 19. Do you have this subspecialty certification? | \_\_ Brain injury medicine\_\_ Hospice and palliative care\_\_ Neuromuscular medicine\_\_ Pain medicine\_\_ Pediatric rehabilitation medicine\_\_ Spinal cord injury medicine\_\_ Sports medicine |
| 20. What is your affiliation to your residency program? | ☐ Program Director☐ Assistant/Associate Program Director☐ Other (Please specify): |
| 21. For how many years have you practiced PM&R? | \_\_ |
| 22. Level of ultrasound training and experience: Total number of hours of ultrasound training | \_\_ |
| 23. Level of ultrasound training and experience: Total number of diagnostic ultrasound exams performed | \_\_ |
| 24. Please include any additional comments regarding specific questions or this survey in general: |