**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 all  1= Taught, but without US-guided technique  2= Taught with US=guided technique <50% of the time  3= Taught with US-Guided technique about 50% of the time  4= Taught with US-Guided technique > 50% of the time  5= 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: | | | | | | | | | | |