Cadaver-Based Competency Assessment of Advanced Interventional Pain Procedures in Fellowship Training: A Pilot Study

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ASRA PAIN MEDICINE

25th Annual Pain Medicine Meeting

November 5-7, 2026 | Tampa, Florida

#ASRAFALL26

Introduction

Advanced interventional pain procedures require technical skills that may be difficult to develop through routine clinical exposure alone due to limited case volume, procedural complexity, and patient-safety considerations. Cadaver-based simulation provides a controlled environment for fellows to develop and practice these skills using realistic anatomy without patient risk.[1,2,4,5] However, hands-on exposure does not necessarily establish procedural competency, and objective assessment of advanced pain procedures remains limited. Structured checklists and global rating scales, adapted from the Objective Structured Assessment of Technical Skills (OSATS), offer complementary methods for evaluating both procedural steps and overall technical performance.[3] We therefore evaluated procedural competency and knowledge acquisition among pain medicine fellows following a structured cadaver laboratory encompassing multiple advanced interventional pain procedures.

Material and Methods

Five UTHSCSA pain medicine fellows completed a single cadaver laboratory session covering eight advanced procedures: peripheral nerve stimulation, balloon kyphoplasty, basivertebral nerve ablation (BVNA), intrathecal pump placement, sacroiliac joint fusion, MILD procedure, DRG stimulator placement, and Minuteman procedure. Faculty evaluators scored each procedure using a standardized 7-item checklist (0-2 points per item, maximum 14; MILD maximum 12, as one item did not apply) and a 5-domain Global Rating Scale (GRS, 1-5 points per domain, maximum 25) scored once per fellow across the session, an approach adapted from objective structured assessment of technical skills (OSATS) methodology.[3] A 20-item written knowledge test covering all procedures was administered before and after the laboratory. This was a single-timepoint, descriptive pilot benchmarking procedural competency alongside pre/post knowledge change, rather than a pre/post procedural comparison.

Figure 1



UTHSCSA Faculty evaluating pain fellows in Balloon Kyphoplasty and Basivertebral Nerve Ablation procedures.

Figure 2



UTHSCSA Faculty evaluating pain fellows in Peripheral Nerve Stimulation.

Figure 3



UTHSCSA Faculty evaluating pain fellows in Dorsal Root Ganglion Stimulation and Minuteman procedure.

Results

Knowledge scores increased from a mean of 64.0% pre-laboratory to 87.0% post-laboratory (+23.0 percentage points; range, 10–40) across all five fellows. Procedural checklist performance was high overall (95.8% across 39 complete evaluations), with near-ceiling performance for Minuteman, peripheral nerve stimulation, and BVNA (100%). Intrathecal pump and sacroiliac joint fusion averaged 98.6%, while kyphoplasty averaged 90.0%. DRG stimulation (91.4%; range, 57.1–100%) and MILD (88.3%; range, 66.7–100%) demonstrated the greatest variability. Mean global rating scale performance was 19.1/25 (76.4%), lower than checklist scores, reflecting its broader assessment of technical performance. One incomplete BVNA evaluation was excluded.

Discussion

This pilot demonstrates feasibility of pairing objective checklist and GRS competency assessment with knowledge testing for advanced interventional procedures in a fellowship cadaver laboratory, consistent with prior calls for structured procedural simulation curricula in pain medicine training.[4,5] Knowledge gains were consistent across fellows, while checklist performance showed a ceiling effect on most procedures alongside meaningful variability on higher-complexity techniques, suggesting DRG and MILD should be prioritized for expanded simulation time in future curricula.

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