

NEUROSURGERY CADAVER LAB MANUAL

Organizing In-Person and Remote Training for Senior Students with Expert Tutors

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Introduction

The neurosurgery cadaver lab workshop represents a cornerstone educational experience for senior students pursuing neurosurgical training. This manual provides comprehensive guidance for organizing both in-person and remote elements of this critical training activity, ensuring meaningful learning experiences for all participants.

Purpose of the Cadaver Lab

The cadaver lab provides irreplaceable hands-on experience with human neuroanatomy through carefully prepared specimens. This activity focuses on:

- Detailed anatomical relationships
- Practical surgical approaches
- Technique refinement under expert guidance
- Development of psychomotor skills essential to neurosurgical practice

Benefits of the Hybrid Approach

By incorporating both in-person and remote elements, this model:

- Expands educational reach to students unable to attend physically
- Provides supplementary learning angles through multiple camera views
- Creates permanent educational resources through recording (with appropriate permissions)
- Enables international expert participation regardless of location

2. Planning and Preparation

Timeline (6 Months Prior to Workshop)

Timeframe	Tasks
6 months prior	Secure cadaver lab facility
	Begin faculty recruitment
	Establish preliminary budget
	Apply for necessary institutional approvals
4 months prior	Finalize faculty commitments
	Secure cadaver specimens
	Order specialized equipment
	Begin participant recruitment
3 months prior	Set up technical infrastructure for remote participation
	Finalize curriculum and lab schedule
	Send pre-workshop materials to participants
1 month prior	Conduct technical rehearsal with remote setup

Timeframe	Tasks
1 week prior	Finalize specimen preparation protocols
	Confirm all logistics and personnel
	Test all audiovisual equipment
	Prepare specimens according to workshop needs
	Brief all faculty and technical staff
	Distribute final instructions to participants

Budget Considerations

1. Facility Costs

- Cadaver lab rental
- Specimen acquisition and preparation
- Waste disposal and sanitation

2. Equipment

- Surgical instruments and disposables
- Protective equipment
- Audiovisual technology for remote broadcast

3. Personnel

- Honoraria for expert faculty
- Technical staff compensation
- Laboratory technician fees

4. Technology

- Streaming equipment
- Secure videoconference platform functioning
- Recording and storage solutions

5. Miscellaneous

- Educational materials
- Assessment tools
- Insurance and liability coverage

3. Facility Requirements

In-Person Laboratory Space

- Minimum square feet required per station (1 cadaver with 2-3 participants)
- Appropriate ventilation system meeting healthcare standards
- Dedicated specimen preparation area
- Adequate lighting (overhead and task lighting)
- Proper drainage and cleaning facilities
- Temperature control (18-20°C ideal)
- Proximity to handwashing and changing facilities
- Secure storage for specimens and equipment

Remote Broadcast Requirements

- High-speed internet connection (minimum 100 Mbps upload)
- Dedicated space for control station and technical team
- Soundproofing or noise reduction measures
- Multiple power outlets with backup power source
- Space for camera setup around each specimen without obstructing in-person participants

4. Equipment and Resources

Cadaver Specimens

- 1 specimen per 2-3 in-person participants
- Fresh or specially prepared specimens
- Pre-injected vascular structures (color if possible)
- Properly secured specimens to allow for position changes during procedures

Surgical Equipment (Per Station)

- Complete neurosurgical instrument set including:
 - Dissection instruments

- Brain retractors (various sizes)
- Craniotomy instruments
- Spine instrumentation (if relevant to workshop focus)
- Operating headlights
- Specialized drilling equipment
- Microscope or loupes based on procedures
- Disposable supplies (sutures, gloves, etc.)

Protective Equipment

- Surgical gowns (fluid-resistant)
- Face shields or protective eyewear
- Surgical masks
- Gloves (consider non-latex options)
- Shoe covers
- Disposal containers for biohazard materials

Audio-Visual Technology

1. Per Station Equipment

- 2-3 HD cameras (minimum 1080p):
 - Overhead wide view
 - Closeup procedure view
 - Faculty demonstrator view
- Dedicated lighting for video clarity
- HD monitor for remote participant visibility

2. Central Control System

- Video switching hardware
- Audio mixing equipment
- Multiple display monitors
- Recording hardware and storage

- Backup power supply

3. Software and Connectivity

- Secure video conferencing platform with breakout room capability
- Streaming software with multi-camera support
- Digital annotation tools
- Cloud storage for recordings
- Backup internet connection

5. Faculty and Staff

Required Personnel

1. Faculty

- Lead neurosurgeon (workshop director)
- 2-3 expert neurosurgical instructors per 10 participants
- Remote faculty experts (optional)

2. Technical Staff

- Laboratory technicians (1 per 4 stations)
- Audiovisual technicians
- IT support specialist

3. Administrative Support

- Workshop coordinator
- Registration manager
- Documentation specialist

Roles and Responsibilities

1. Workshop Director

- Overall curriculum design and implementation
- Faculty coordination
- Quality control of educational experience

- Resolution of any issues that arise

2. Expert Instructors

- Demonstration of technical approaches
- Direct supervision of participant work
- Real-time feedback and coaching
- Assessment of participant performance

3. Technical Staff

- Specimen preparation and maintenance
- Equipment setup and troubleshooting
- Safety monitoring
- Waste management

4. AV/IT Team

- Camera operation and positioning
- Video and audio quality control
- Remote participant technical support
- Recording management

6. Participant Selection and Preparation

Selection Criteria

- Senior medical students with neurosurgical focus
- Residents in neurosurgery program
- Demonstrated basic knowledge of neuroanatomy
- Completion of prerequisite coursework
- Commitment to full workshop participation

Pre-Workshop Preparation

1. Required Reading Materials

- Detailed neuroanatomical atlas sections

- Surgical approach descriptions
- Technical papers on procedures to be practiced
- Ethical guidelines for working with cadaveric specimens

2. Online Preparation Modules

- Virtual 3D anatomy review
- Procedural videos of techniques to be practiced
- Equipment familiarization tutorials
- Pre-test knowledge assessment

3. Logistical Information

- Detailed schedule
- Required personal protective equipment
- Laboratory protocols and safety procedures
- Remote participation technical requirements

7. Remote Participation Setup

Technical Requirements for Remote Participants

1. Hardware

- Computer
- High-quality webcam
- Headset with microphone
- Stable internet connection (minimum 25 Mbps download)

2. Software

- Specified videoconferencing platform
- Digital annotation tools
- Document sharing capabilities

3. Environment

- Private, professional setting

- Adequate lighting for video participation
- Minimal background distractions
- Backup power source recommended

Interactive Elements for Remote Participants

1. Real-time Interaction

- Dedicated moderator for remote participant questions
- Regular scheduled interaction points during each session
- Private messaging channel to faculty

Remote Faculty Engagement

- Remote experts can provide commentary during demonstrations
- Breakout sessions with remote participants for focused discussion

8. Workshop Structure and Curriculum

Orientation and Fundamentals

- **Anatomical Orientation** (1 hour)
 - Detailed review of relevant neuroanatomy
 - Approach planning and rationale
 - Pre-test administration
- **Basic Approach Demonstration** (1 hour)
 - Expert-led demonstration of key approaches
 - Step-by-step technique explanation
 - Critical landmark identification
 - *Remote Element: Multi-angle views*
- **Initial Hands-on Practice** (3 hours)
 - Participant-performed basic dissections
 - Individualized coaching and feedback

- Skill foundation development
- *Remote Element: Dedicated camera with rotation through views*

Review and Integration (1 hour)

- Specimen review and discussion
- Clinical correlation of anatomical findings
- Question and answer session

Advanced Techniques

- **Advanced Approach Demonstration**
 - Complex surgical situations
 - Managing anatomical variations
 - Complication avoidance strategies
- **Advanced Hands-on Practice**
 - Progressive complexity of tasks
 - Technique refinement
 - Specialized approaches
 - Advanced instrumentation practice
- **Final Review and Assessment**
 - Comprehensive specimen review
 - Post-test administration
 - Survey completion

Sample Schedule

Time	Activity	Remote Participant Activities
8:00-8:30	Registration and Orientation	Technical Check-in
8:30-9:30	Anatomical Orientation	3D Anatomy Exploration
9:30-10:30	Basic/advanced Approach Demonstration	Multi-angle Observation

Time	Activity	Remote Participant Activities
10:30-10:45	Break	Break
10:45-12:15	Hands-on Practice I	Rotating Camera Views
12:15-13:00	Lunch	Lunch Break
13:00-14:30	Hands-on Practice II	Remote Faculty Engagement
14:30-14:45	Break	Break
14:45-16:15	Hands-on Practice III	Station Rotation Views
16:15-17:15	Review and Assessment	Digital Collaboration Session

9. Assessment Protocol

Pre-test Components

1. Anatomical Knowledge Assessment

- Digital quiz on neuroanatomical structures
- Identification of critical surgical landmarks
- Understanding of anatomical variations

2. Self-assessment of Confidence

- Likert scale rating of confidence in anatomical understanding
- Procedure-specific confidence ratings
- Technical skills self-evaluation

Post-test Components

1. Anatomical Knowledge Reassessment

- Parallel form of pre-test questions
- Physical or digital structure identification
- Relationships between critical structures

2. Self-assessment of Confidence

- Comparative confidence ratings
- Perceived improvement metrics
- Ongoing learning needs identification

Emotional Impact and Satisfaction Survey

1. Psychological Impact

- Experience working with cadaveric specimens
- Emotional reaction assessment
- Coping strategies identification

2. Ethics and Respect Evaluation

- Understanding of donation importance
- Respect demonstration during procedures
- Ethical considerations in cadaveric education

3. Educational Value Assessment

- Perceived value comparison (cadaveric vs. simulation)
- Remote vs. in-person experience comparison
- Overall educational impact rating

4. Knowledge Application

- Anticipated clinical application of knowledge
- Confidence in skill transfer to clinical setting
- Perceived readiness for observed clinical application

Remote vs. In-Person Assessment Considerations

- Identical knowledge assessments for both groups

10. Ethical Considerations

Cadaver Procurement and Handling

- Proper documentation of informed consent from donors

- Respectful handling of specimens at all times
- Appropriate ceremony acknowledging donor contribution
- Compliance with institutional and national regulations

Participant Preparation

- Psychological preparation for working with human remains
- Clear guidelines on respectful behavior
- Photography restrictions and privacy considerations
- Support resources for those experiencing emotional distress

Remote Participation Considerations

- Secure transmission of all video content
- Prohibition of personal recording by remote participants
- Controlled environment requirements for remote viewing
- Explicit acknowledgment of confidentiality requirements

Post-Workshop Handling

- Proper disposition of remains according to institutional policies
- Secure storage or destruction of all workshop recordings
- Anonymization of any retained educational materials

11. Documentation and Follow-up

Required Documentation

1. Participant Records

- Attendance verification
- Assessment results
- Faculty feedback notes

2. Educational Materials

- Selected recordings (with appropriate permissions)

- Annotated images for future reference
- Faculty demonstration highlights
- Written technique guides

3. Evaluation Data

- Aggregate assessment results
- Satisfaction survey analysis
- Comparative data between in-person and remote participants
- Faculty evaluation of workshop effectiveness

Follow-up Activities

1. Participant Follow-up

- Access to faculty for post-workshop questions
- Information on advanced workshop opportunities

2. Faculty Debrief

- Review of workshop outcomes
- Discussion of technical and educational challenges
- Improvement recommendations for future workshops
- Research opportunities identification

3. Institutional Reporting

- Outcomes report for sponsoring institution
- Compliance documentation
- Financial reconciliation
- Impact assessment for future funding

12. Appendices required

Appendix A: Pre-test Assessment

Appendix B: Equipment Checklist

Appendix C: Specimen Preparation Protocol

Appendix D: Remote Participant Technical Guide

Appendix E: Emergency Protocols

Appendix F: Consent and Confidentiality Forms

Appendix G: Post-workshop Survey