Problem Identification and Needs Assessment

Identification of targeted learners
The targeted learning population consists of PGY-1 orthopaedic surgery residents and other residents entering orthopaedic surgery residency educational programs without significant experience in handling bone, osteotomes, chisels, drills, power saws, and gigli saws. Other learners could include residents from other surgical subspecialties with the need for experience in these areas and also other midlevel providers who will be functioning in the orthopaedic operating room setting.

Identification of need or problem for targeted learners
The overall goal of this exercise is to obtain cognitive knowledge, observe, practice, and demonstrate to a level of proficiency the skills basic to bone handling. The skills that will be taught in this module are basic to bone handling and are critical to the targeted population for performing and assisting in the orthopaedic operating room setting.

Current educational approach to address need or problem
The current educational approach for learners needing skills in bone handling is based on previous experience and master surgeon-novice surgeon apprenticeship experiences. These techniques are generally demonstrated by faculty or senior level residents in 'live' operating room experiences. Once the learner has watched and indicated understanding of the skills involved, they are given the opportunity to participate under direct observation with immediate feedback.

Ideal educational approach to address need or problem
The ideal educational approach would consist of a didactic teaching session to cover bone anatomy, saw and drill handling, and proper bone cutting techniques. The didactic session would be followed by a skills acquisition session involving sawbones and the use of those instruments. The learner would obtain hands-on experience in using the instruments, handling bone, and performing osteotomies and protecting soft tissues. The implications and applications of freehand cutting of the bone would also be taught. The cuts and possible damage to surrounding soft tissues would be evaluated.

Goals and Objectives

Specific educational goals
The learner will:

- Understand basics and terminologies in bone deformities (CORA, angulation, translation, mechanical axis, anatomical axis)
- Understand the concepts osteotomy techniques (closing wedge, opening wedge, rotational, translational, dome)
- Understand the characteristics and techniques related to the instruments used for osteotomy (osteotome, chisel, drill, power saw, gigli saw)
- Understand the technique to mitigate soft tissue trauma or excessive heat due to the osteotomy

Specific cognitive, affective, psychomotor task objectives
The learner will:
• Demonstrate knowledge pertinent to the above tasks

**Syllabus Development**

**Assumptions**

The learner will have very little baseline knowledge/skill in placement or use of orthopaedic instrumentation. It will be assumed that the learner has little or no knowledge about bone anatomy as it relates to drilling/cutting. Basic anatomic knowledge about the extremities will be expected.

**Suggested readings**

- *Principle of Deformity Correction*, Dror Paley, Chapter 4 and 5.

**Description of laboratory module**

This laboratory module will consist of 4 separate exercises including pre-operative templating of the deformity and using various osteotomy instruments in performing different osteotomy techniques on a saw bone.

**Description of techniques and procedures**

**Tibia Sawbone with Soft Tissue Envelope Surrogate (see video)**

- In this exercise you will use a gigli saw to make a flat osteotomy for distraction osteogenesis at the level of the mid shaft sawbone (bone surrogate) to practice the following skills.
  - Subperiosteal dissection
  - Percutaneous suture passage
  - Gigli saw technique

**Tibia Sawbone with far Cortical reinforcement using duct tape at the plateau level (see video)**

- In this exercise you will use a proximal tibia sawbone (bone surrogate) with duct tape reinforced to the far cortex to practice a lateral closing wedge osteotomy to correct 10 degrees of varus deformity at the supramalleolar region.
  - Preoperative planning
  - K-wire guide
  - Osteotomy using a power saw
  - Using Chisels for fine tuning the cuts
  - Close wedge manually and temporary k-wire fixation

**Common errors and prevention strategies**

- **1st exercise**
  - Inadequate subperiosteal dissection
  - Failure in suture retrieval
  - Failure in keeping the gigli saw under tension
  - Inadvertent injury to the overlying soft tissue

- **2nd exercise**
  - Saw blade skiving off
  - Saw blade jamming
  - Inappropriate amount of bone cut
- 3rd exercise
  - Same as 2nd exercise
  - Incomplete removal of bone wedge
- 4th exercise
  - Inadequate or non-parallel drilling
  - Poor control of a Burr or a power rasp

Demonstrate expert performance
Videos of each Task will demonstrate proper usage of the equipment and offer tips and techniques to achieve the proper results.

Recommendations for motor skills practice
- Repeat the steps as needed for practice.

Supplies and station setup
- Table with vice
- Tibia sawbone x 2
- Pipe insulating foam
- Power Driver
- Gigli saw
- Saw blades
- Osteotomes
- AO chisels
- Duct tape

Suggested duration for completion of module
- Review of Module Videos (1 hours)
- Module Stations/Practice (2 hours)
- Video competency assessment (1 hours)

Estimated budget
- Tibia sawbone x2
- Disposable instruments (Gigli saw, saw blade, AO chisel blades)
- Minor (insulating foam, duct tape)

Learner Evaluation and Feedback

Methods of Performance Assessment
The learners will be assessed in their ability to complete the tasks by video to review competence. In addition, the paper models used in the videos will be assessed for accuracy – these

Suggested Proficiency Benchmarks
The learner should be able to utilize the instrumentation properly and perform the tasks efficiently and accurately, with appropriate protection of surrounding soft tissues.

Methods for Learner De-briefing and Feedback
Feedback will be obtained through open discussion and a questionnaire to assess course utility, usefulness, and effectiveness.

Periodic Curriculum Review, Evaluation, Validation, and Refinement
The module will be reviewed by faculty and learners on an annual basis and this will include evaluation for improvements in either the didactic or technical skill portions. The learners will be observed in operating room settings and the utility of the module in improving performance will be evaluated by questioning senior supervising surgeons.