



STEM Day Lesson Plan

Title: “Repairing Broken Bones”

Subject Area: Medicine

Learning Activity Description:

We will first introduce ourselves, what we are currently learning about at WSU School of Medicine (medicine, health and the human body, and caring for others), and what happens when you break a bone. We will go through what the steps are in evaluating someone with an injury to see if they have a broken bone (otherwise known as a “fracture”). After finding that a broken is, in fact, broken, we will explain the best ways in which to care for it and to recover from such an injury.

Lesson Activity Objective:

- Discuss the role of a doctor
- Discuss what kinds of doctors care for patients with a broken bone
- Discuss the signs and symptoms of a fracture
- Involve the students in the casting of a “broken bone” and walk them through how a doctor would evaluate a patient with a suspected broken bone
- Discuss how a broken bone heals and the utility of a cast

Lesson Activity Outcomes:

- What is the role of a doctor?
- What is a fracture?
 - o A fracture is a fancy word for a broken bone
 - o There are numerous types of broken bones – they all differ based on the location and severity
 - o Some can be simple fractures and some are complex
 - o Some heal with a splint and rest, some require and cast, and some might even require surgery
- What are the signs and symptoms of a fracture?
 - o Pain, bruising, limping or “babying” a part of the body, deformity, swelling, tenderness
- What should one do if they break a bone?
 - o They should keep the injury still (especially if neck or back injury), remain calm, tell an adult, who may splint the affected area, and go to the doctor.
 - o An X-ray is a picture of your bones and provides a map for the doctor to see what direction to take with your injury.
 - o Then, the doctor may cast the break so that the bone can heal or “knit” back together.

- Casting is really just a big hard bandage, much like a bandaid.
- Plaster is the same material you use in art class to make masks.
- Another material, fiberglass is a kind of plastic that gets real hard like plaster.
- Some breaks require a sling or crutches to help take pressure off the bone while it is healing.
- How can we keep our bones healthy?
 - Through exercise and good nutrition
 - Performing exercises or work with weights makes your bones denser and less likely to break.
 - Calcium and Vitamin D keep bones healthy. Calcium is found in milk products like cheese and yogurt, and in green leafy vegetables, like spinach and collared greens.
 - Vitamin D is found in fish like salmon and tuna. Your body even makes Vitamin D when it is exposed to the sun!! But be careful, the sun can damage the skin too, so always wear sunblock.
 - Knowing one's body and responding to things when they hurt
- How do we care for a cast?
 - Its important to keep a cast from getting wet in the shower by bathing or wrapping it in a plastic bag.
- What do casts look like?
 - Most casting material is now fiberglass and comes in fun colors!
- How do we remove a cast?
 - A special saw is used to remove the cast. It will cut plaster and fiberglass, but not skin!
- What happens after a cast is removed?
 - Because a cast can be on for quite some time (6-8 weeks), hair can grow under the cast and the muscles will get smaller and weaker (atrophy).
 - One must be careful after the cast comes off and build up strength slowly, sometimes with the help of physical therapy.

Materials/Supplies Listed:

Plaster Casting Material
 Buckets of Warm Water
 Scissors
 Blue Pads or Newspapers to catch water under buckets
 Stockinette (preferred but not required)
 Casting Padding (preferred but not required)
 Markers to sign the casts

Teacher Procedures:

Most finger breaks do not require casting, but instead are splinted, often to the adjacent finger. For this station though, we can teach a quick lesson in casting and use minimal materials by casting a finger. Because the casting material is usually quite wide and not meant for fingers, we cut in in half lengthwise. You will need no more than 8 inches of casting material for the average child's finger (usually 5-7). If you have stockinette, cut a piece 1.5 inches longer than the finger and slide over "broken" finger. If you have cast padding, wrap the finger with the padding. Then, soak the pre-cut casting material in warm water and squeeze out as much water as possible. The wrap the finger, starting

from the base and working towards the tip, overlapping 1/2-3/4 of the last wrap each pass. Stop wrapping at the fingertip and fold the remaining stockinette back over the cast. The cast should dry in about 5 minutes and can then be slipped off the finger.

Preparation Time for Learning Activity:

5-10 minutes to ready the materials and prepare buckets of water.

Room set-up:

Separate the materials so they are all ready to use. Prepare the work stations with casting supplies and a bucket of water.

Group Strategies (example, group size, expected time for groups, etc.)

Groups can be large or small, but usually instruction works best if teacher-student ratios are under 1:4. That way, the teacher is able to help each student assemble their own cast. A group of 4 students might require about 15 minutes to complete all the casts, however, casts will take about 10-15 minutes for drying. In that time, you can teach, answer questions, talk about future goals and aspirations, etc.

Assessment Criteria/Rubric:

Can the students identify the signs and symptoms of a potential fracture? Can students describe the next steps if one believes they may have a fracture? How would a doctor evaluate someone with a potential fracture? What is the utility of a cast? Do all fractures need a cast? How do broken bones heal? How do you care for a cast?

Closing/Transition to next activity:

Ask the students if they have any questions about bones, medicine or becoming a doctor. Encourage the students to take care of themselves and to always be conscious of their health. The body is a miraculous thing, which can heal itself, but we must help it grow big and strong!