A Virtual Case-Based Learning Module on Acute Ischemic Stroke for Pre-Clinical Medical Students

Timothy Browne, MS and Maureen Stabio, PhD
University of Colorado School of Medicine- Aurora, CO.

Background

- 795,000 patients suffer strokes annually in the U.S. and is the fifth leading cause of death.
- Meta-analysis shows small group learning in medical education increases learner and teacher enjoyment, student engagement, and students' perception of their learning.
- Paucity of case-based learning modules on acute ischemic stroke seen in survey of MedEd Portal.

Project Aim

Design and implement a case-based learning module on acute ischemic stroke for pre-clinical medical students in at the University of Colorado.

Learning Objectives

1. Describe the history, physical exam, laboratory, and imaging findings of acute ischemic stroke.
2. Correlate a pathologic brain CT with the locations of cranial nerve nuclei.
3. Describe the importance of time in the management of acute ischemic stroke.
4. Describe the deficits that will be encountered due to ischemia of the cranial nerve nuclei.
5. Identify the indications and contraindications for IV tPA in acute ischemic stroke.

Learning Module Outline

1. Instructions and introduction
   - Introduces layout of module
   - Acute Ischemic Stroke - A Case-Based Learning Module Using Real Medical Records

2. Pre-module survey
   - 6 MCQs on scratch-off cards based on prior knowledge
   - Pre-Module Survey (scratch-off card)
     - Fill in the blanks with the correct answer:
     - a. External carotid arteries, Vertebral arteries
     - b. Vertebral arteries, internal carotid arteries
     - c. Internal carotid arteries, vertebral arteries
     - d. Vertebral arteries, external carotid arteries

3. Patient case introduction
   - Introduction of patient and history of present illness
   - Case Part 1 - Continued
     - You enter the room to find Jeff, a 45-year-old white male, sitting upright on the bed, alert and oriented. He has a right-sided facial droop.
     - You notice he looks anxious and he has overt right-sided facial droop.
     - Jeff's mother confirms that he seemed completely normal when she saw him at about 9:30 that morning (approximately 3 hours ago).

4. Initial case workup
   - NP, PMH, Meds, NIHSS, physical exam, and lab tests
   - NIH Stroke Scale

5. Head computed tomography
   - Head CT from anatomic donor
   - Noncontrast Brain CT - Can you ID the defect?

6. Discussion questions
   - Discussion prompts regarding workup and next steps
     - Why might this patient not be a good candidate for IV tPA?
     - Are there other therapies that you should consider for this patient?

7. Treatment and clinical course
   - Discussion of IV tPA and case resolution
   - Take Home Points
     - Time is critical in acute ischemic stroke! Once a diagnosis is confirmed, begin treatment as soon as possible.

8. Neuroanatomic correlation
   - 15 MCQs with dissected brain images and neurohistology

Results

- Clear learning objectives
- Followed logical order
- Able to follow patient's story
- This is a valuable experience
- Would use similar modules
- Questions were too easy
- Questions were too hard
- Enjoyed small group learning
- Enjoyed using scratch cards

Conclusions

- A virtual case-based learning module was successfully created using real medical records, brain dissection images, 3D computer modeling, and histologic images.
- 100% of students reported enjoying working in small groups and would use similar modules.
- The COVID-19 pandemic has further increased the need for virtual learning in medical education.

Future Directions

We will implement this learning module into the Nervous Systems block in a 90-min session and add take-away points for discussion questions.

References