Clinical Application and Initial Response of Seizures and Epilepsy in the Hospital Setting – An Educational Tool for Medical Students

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Abstract

Introduction: At the University of Toledo College of Medicine and Life Sciences, 3rd year medical students experience the field of neurology through a 5-week clerkship and rotate through different inpatient services along with outpatient clinics. Students receive didactic lectures from senior faculty members prior to clinic about various neurological topics to supplement their in-clinic learning. Students also receive clinical setting-based teaching through the residents they work with. In this research project, we focus on the impact of resident led inpatient lectures on clinical knowledge and management of seizures.
Methods: 3rd year medical students rotating on the neurology clerkship at University of Toledo were divided into two groups - if they received a resident-led didactic lecture or not. They were then given an online link to an optional anonymous survey. Students rated their perceived competency on a Likert scale of "strongly agree (high score)" to "strongly disagree (low score)" on how to clinically identify seizures or epilepsy and initial management. Additionally, students were given several examples of seizure management and using the same scale, asked if they agreed or disagreed.
Results: 3rd year medical students who received the resident-led didactic lecture on seizure and epilepsy clinical application and initial management scored higher on average on the survey, with statistical significance ($p < 0.05$) seen when asked to clinically identify a seizure and how to record a seizure event in the hospital setting.
Discussion: Resident-led didactic lectures in the hospital setting can provide an additional educational tool to 3rd year medical students on their neurology rotation. This may be helpful for students to link their classroom-based knowledge to clinical application towards seizure and epilepsy patients on the wards.

Keywords: Epilepsy, Neurology, Medical Student, Education

1. Introduction

At the University of Toledo College of Medicine and Life Sciences, 3rd year medical students experience the field of neurology through a 5-week clerkship through several inpatient services along with outpatient clinics. The inpatient services are typically divided into a primary, consult, and stroke teams while the outpatient clinics are focused on different neurology subspecialties such as movement disorders, stroke, seizures, and more. During the rotation, students receive didactic lectures in a non-clinical setting

from senior faculty members about various neurological topics which they use during patient interactions. Students additionally receive clinical setting-based teaching through the residents they work with. Resident-based teaching can be provided in a variety of methods including direct observation of resident clinical management, formalized lectures in a classroom setting, lessons based upon specific medical cases seen on the wards, or informalized quizzing. Students are therefore exposed to a wide array of educational tools, some of which are more standardized. These teaching tools are commonly seen in other medical school curriculums that implement 2 years of pre-clinical and clinical and have been shown to have a positive impact on medical student learning (Karani et. Al). Resident led teaching has also been rated similar in quality and satisfaction to senior faculty (Naeger et. al). In this research project, we focus on the impact of resident-led inpatient lectures on clinical knowledge and management of seizures and epilepsy via a structured lecture while enabling residents to expand on this framework. Our educational objectives for these lectures were to improve 3rd year medical student's abilities to clinically identify and recognize a seizure, understand the initial steps of inpatient seizure management, and know the "4R's" of seizure response (a common mnemonic used to remember initial seizure response steps). Through resident-led lectures, we hope to provide a tool for neurology residents to medical students in the hospital setting.

2. Materials and Methods

The resident-led lectures on clinical application and initial management of seizures and epilepsy were conducted at the University of Toledo as a part of 3rd year medical students' education while on their neurology rotation. As a prerequisite, 3rd year medical students were required to attempt the USMLE Step 1 examination prior to starting the neurology rotation and received a senior faculty-led lecture on the clinical diagnosis and management of seizures. For the resident-led lectures, one assigned neurology resident who had experience with seizure and epilepsy management acted as a facilitator. The use of one resident was to ensure standardization of teaching.

Prior to beginning the study, IRB approval was obtained from the University of Toledo Human Research Protection Program. 3rd year medical students were first divided into two cohorts, one for intervention (resident-led lectures), and one without intervention. Learners assigned to the intervention were given a 2-hour resident-led didactic lecture while on a neurology inpatient service. Using PowerPoint and whiteboard drawings, objectives covered during the lecture included identifying seizures and epilepsy, their pathophysiology, specific types of seizures, associated neurological signs of seizures, and the initial management of

seizures (Seizure and Epilepsy Lecture). Accompanying videos of various types of seizures were also shown as examples (Seizure and Epilepsy Lecture) which were taken from YouTube. Throughout the lecture and after, residents answered the questions of the 3rd year medical students. After the lecture, students were encouraged to retain the knowledge they obtained from the lecture and apply it to patients who had a history of epilepsy or seizures.

At the end of the week, both groups were asked to complete an online optional and anonymous survey within 1 week to evaluate their clinical competency (Survey). Students were provided with a link for a Qualtrics survey which did not require any login information or location data for the respondents. The Qualtrics-powered survey asked participants whether they received the resident-led didactic lecture (to confirm cohort group) followed by several questions regarding their competency of seizure and epilepsy clinical application and management. Participants were then asked to respond on a Likert scale from "strongly agree" to "strongly disagree." Using this scale allowed us to evaluate students' confidence regarding several areas of seizure and epilepsy management in a non-assessment type manner. This was done to reduce stress experienced by many 3rd year medical students regarding their clinical competency and potential impact on their grades. Additionally, several brief example scenarios were listed which students used the same scale to rate the response/action done in the scenario. For example, if a student listed "strongly disagree", it implied that the student thought the action in the scenario was incorrect and vice versa.

2.1 Survey Outline

https://toledouw.iad1.qualtrics.com/jfe/form/SV_77mo0K NPgA4olM

For the following questions, please rate your response on a scale of 1-5 (1 = strongly disagree to 5 = strongly agree) by marking the corresponding box.
1. Able to accurately identify a seizure clinically
2. Know where the red-button is on the EEG machine to capture a time-locked event
3. The 4 R's of seizure first aid include Remove, Restrain, Record, & Reassure
4. Upon witnessing a clinical seizure in the hospital, I will alert the nurse and grab the patient a cup of water

Topic	Non-Intervention Mean Survey Response Score[a] (n=8)	Intervention Mean Survey Response Score[a] (n=8)	Mean Difference (95% Confidence Interval)	p-value
Able to accurately identify a seizure clinically	3	4.75	-1.75 (-2.72 to -0.78)	0.0017
Know where the red-button is on the EEG machine to capture a time-locked event	1.88	4.38	-2.50 (-3.67 to -1.33)	0.0004
The 4 R's of seizure first aid include Remove, Restrain, Record, Reassure (Incorrect)	4.38	3.13	1.25 (-0.39 to 2.89)	0.1244
Upon witnessing a clinical seizure in the hospital, I will alert the nurse and grab the patient a cup of water (Incorrect)	2.75	2.88	-0.13 (-1.54 to 1.29)	0.8524
A first-time unprovoked seizure requires AED's	4.13	2.63	1.5 (-0.09 to 3.09)	0.0625

Table 1. Mean Difference in Survey Scores Among Non-Intervention and Intervention Group (N=16). [a]Rated on a 5-point scale 5=Strongly agree, 4=Agree, 3=Neither agree or disagree, 2=Disagree, 1=Strongly disagree. For incorrect statements lower scores are considered more correct.

5. A first time unprovoked seizure requires AEDs

3. Results

18 individuals replied to the online survey and filled out the survey questionnaire. Of those 18 individuals, 8 were from the intervention arm and 8 were from the non-intervention arm. Two respondents declined to take the survey. Survey questions and practice scenarios are listed below (Survey). Overall, students who received the 2-hour resident-led lecture tended to rate their responses higher were more likely to recognize the correct practice scenario responses (Figure 1 and Table 1). Specifically, students reported greater confidence on clinically identifying a seizure and appropriately recording an inpatient seizure event. Statistical significance was not seen when students were asked about the 4R's of seizure first aid, a common mnemonic used by students and healthcare providers. For the practice seizure scenarios, students in the interventional arm were more likely to align their response to the correct example actions. This was seen when students were asked about the necessity of AED (anti-epileptic drugs) for first time unprovoked seizures. One exception was noted with one of the scenarios where students incorrectly thought bringing water to a patient after a seizure was appropriate. While it is noted that the sample size was small due to the

logistical constraints of the study, 16 participants responded which was the total number of students in the neurology rotation at that time. While the two respondents that declined to take the survey may have been actual respondents refusing to take the survey, it is also possible that those responses were done by accident. Due to the anonymity of the survey, we cannot be certain of the reasoning behind these two responses.

4. Discussion

Through this project, we wish to highlight the utility of resident-led didactic lectures for teaching 3rd year medical students about clinical application and management of seizures and epilepsy in a hospital-based setting. It is interesting to note that students who received the resident-led didactic lectures on average appeared more confident in their knowledge and skill in this subject. While senior faculty-led lectures can assist with student knowledge and clinical learning, we believe the resident lectures serve to reinforce student learning and provide onsite clinical application. This may be due in part to the smaller group size of these lectures as compared to the senior faculty lectures. Through the resident-led lecture format based in the hospital, students were also able to connect their clinical experiences to the content of the lectures more directly, possibly contributing to improved clinical competency. Some possible detriments

Survey Responses about Seizure and Epilepsy in the Hospital Setting - No Lecture Vs. Lecture
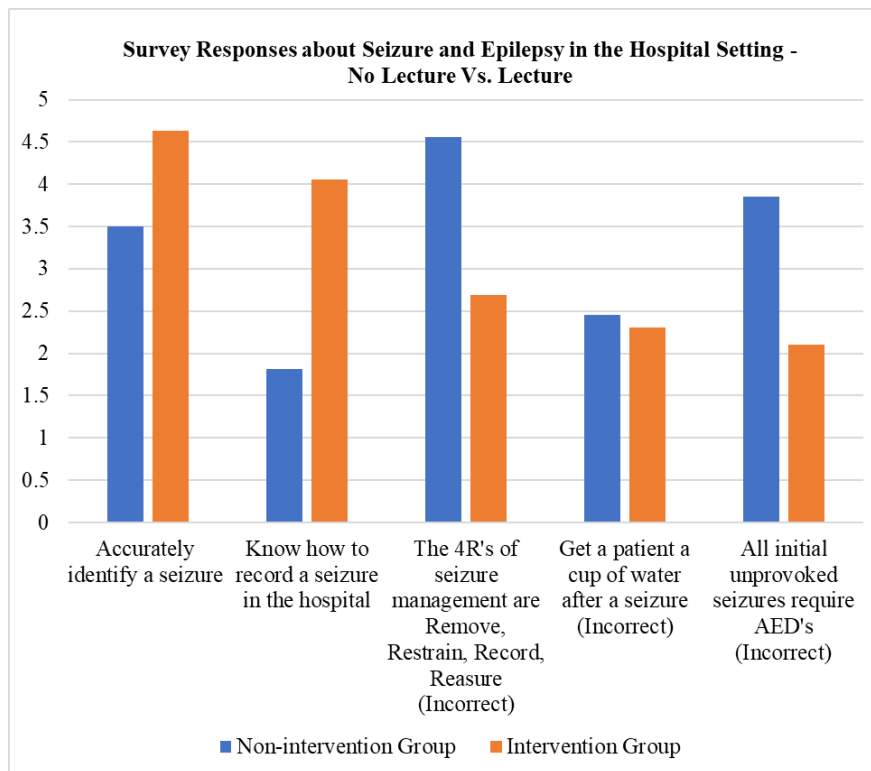
noted with a resident-lecture format include different presentation styles and quality of the facilitating resident, the variability of medical students' preferred learning styles, and diverting away time from clinical experiences that may improve student knowledge. Limitations with this project also include a small sample size inherent to the number of clinical students rotating through neurology at one time. The sample sizes were further worsened by some of the survey participants refusing to take the study. Some variation in knowledge confidence may also be explained by how far along students were within the clerkship. Students who participated in the resident-led lectures later in the course may have had more patient interactions and had additional non-clinical time to study seizures and epilepsy. Although this was not evident on our survey data, this effect may be obscured by the small sample size. We believe however after observing the results with this project, that the benefits outweigh the negatives with structured resident-led lectures in the hospital setting. In future projects, consideration maybe given towards other neurological subjects such as neuro-oncology, movement disorders, strokes, and more.

Author roles

1. Research project: A. Conception, B. Organization, C. Execution. 2. Statistical Analysis: A. Design, B. Execution, C. Review and Critique.
3. Manuscript Preparation: A. Writing of the first draft, B. Review and Critique.
JD 1ABC, 2ABC, 3AB; IS 1ABC, 2AB, 3AB; AS 1ABC, 3B, MR 1ABC, 3B.

Competing interests

The authors of this paper have no conflicts of interest to report. IRB approval was obtained from the University of Toledo Social Behavioral and Educational IRB committee - study 301025.

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