

Introduction

- Little is known regarding the use of smartphones in clinical practice.
- We sought to identify the frequency of and indications for smartphone use during emergency neurological cases.

Methods

- Retrospective review of a prospective, observational, single-center simulation-based study of participants ranging from sub-interns to attending physicians
- Simulation cases included three neurological emergencies:
 1. Acute ischemic stroke followed by tissue plasminogen activator-related hemorrhage
 2. Viral encephalitis complicated by status epilepticus
 3. Cardiac arrest with status epilepticus
- Primary outcome: frequency of smartphone use
- Secondary outcomes:
 - Identification of the correct answer sought via smartphone
 - Performance by level of training:
 - *Novice*: neurology sub-interns and neurosurgery interns
 - *Intermediate*: neurology residents, medical critical care fellows, surgical critical care fellows, emergency medicine critical care fellows
 - *Expert*: neurocritical care fellows and attending physicians
 - Performance on critical action items between participants who used and did not use smartphones

Results

Table 1. Participant Demographics		N = 65
Age, mean (SD)		32.0 (4.8)
Female, n (%)		27 (42)
Level of training, n (%)		
Neurology sub-intern	6 (9)	
Neurosurgery intern	3 (5)	
PGY-2 neurology resident	17 (26)	
PGY-3 neurology resident	6 (9)	
PGY-4 neurology resident	5 (8)	
Medical critical care fellow	7 (11)	
Emergency medicine critical care fellow	6 (9)	
Surgical critical care fellow	1 (2)	
Neurocritical care fellow	8 (12)	
Neurocritical care attending physician	3 (5)	
Stroke fellow	1 (2)	
Stroke attending physician	2 (3)	
Total number of simulation cases, n (%)		
Acute ischemic stroke	37 (29)	
HSV encephalitis and status epilepticus	40 (32)	
Cardiac arrest and status epilepticus	49 (39)	
ENLS certification, n (%)		
	31 (65)	
Experience in medical simulation, n (%)		
	57 (88)	

Figure 1a. Smartphone Use during Simulation Scenarios

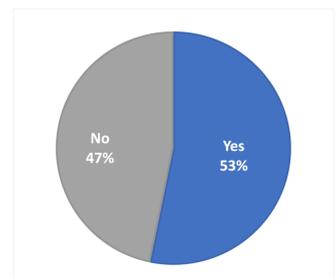


Figure 1b. Identification of Correct Answer using Smartphone

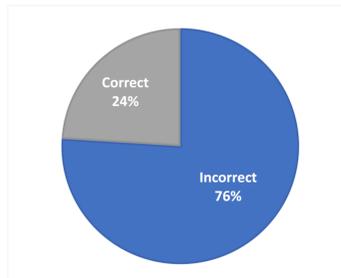
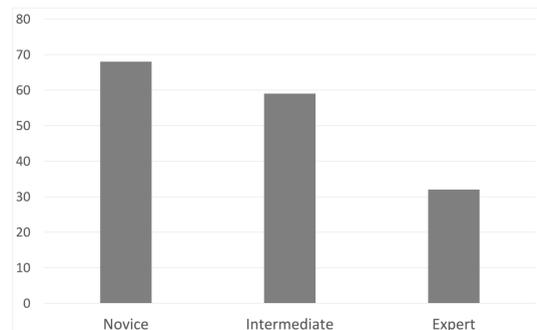
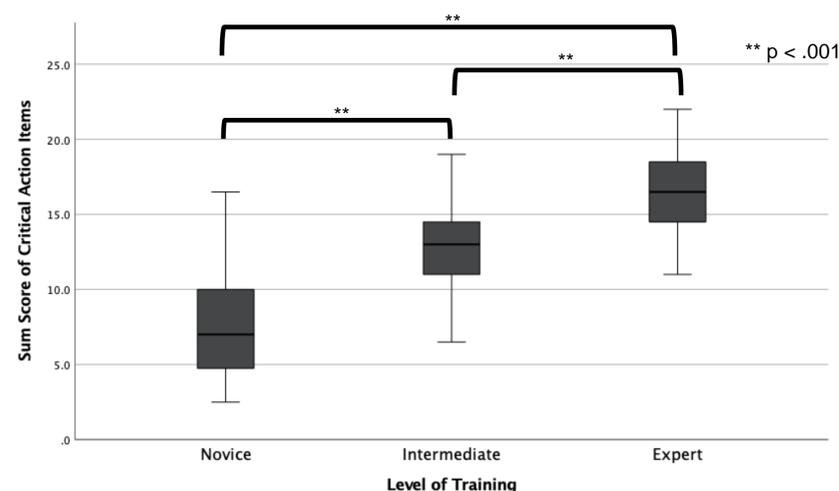


Figure 2. Percent of Participants Using Smartphone by Level of Training



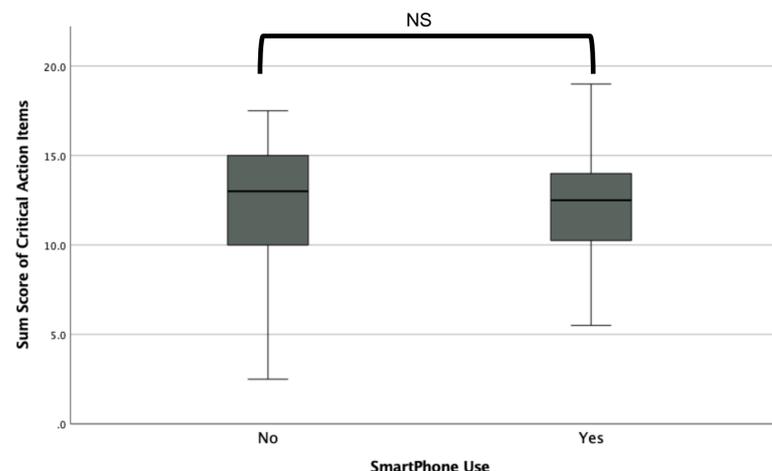
Experts were less likely to use smartphones than novice or intermediate participants, 32% vs. 68% and 59%, respectively, $p < .05$

Figure 3. Sum Score of Critical Action Items by Level of Training



Despite using their smartphones more than other groups, novice participants performed worse than intermediate and expert participants (novice mean score (standard deviation) = 10.1 (3.8) vs. intermediate mean score = 13.0 (2.9) vs. expert mean score = 16.7 (2.8), $p < .001$).

Figure 4. Sum Score of Critical Action Items by Novice and Intermediate Trainee by Smartphone Use



Of novice and intermediate participants, those who used smartphones performed similarly to participants who did not use smartphones (smartphone users' mean score [standard deviation (SD)] = 12.0 (3.2) vs. non-smartphone users' mean score = 12.2 (3.8), $p = .19$)

Results

Figure 5. Correct vs. Incorrect Answers Obtained via Smartphone by Level of Training

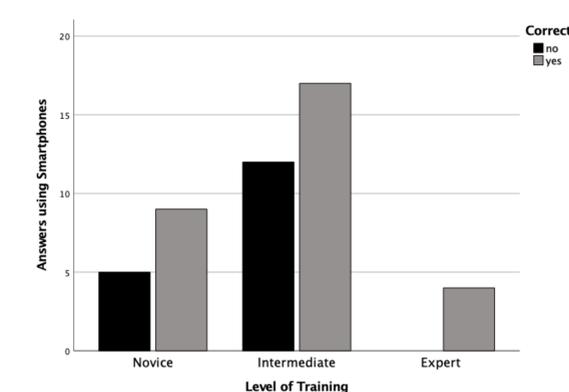
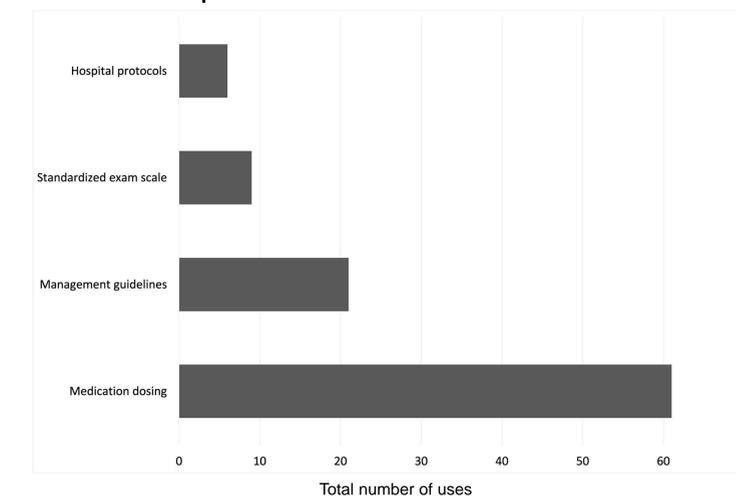


Figure 6. Indications for Smartphone Use



Discussion

- Smartphone use was common in the care of patients with neurological emergencies but did not confer improved clinical performance likely due to incorrect utilization of resources.
- Participants most likely to use smartphones are less experienced and unable to correctly identify clinical solutions using their smartphones.
- A comprehensive evidence-based smartphone application for clinical use during emergency neurological situations may improve performance among non-expert clinicians.