Project Title: Enhancing the Pre-Clinical Neurology Block through Localization and Multidisciplinary Patient/Provider Sessions
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I. Specific educational aims:
 (1) Improve neuroanatomical localization exercises through the following:
   a. Development of intense, interactive, high-yield case-based pre-clerkship lab sessions
   b. Develop a neuroanatomical localization tool used in throughout the course and as a web/mobile resource to continually reinforce localization
 (2) Inspire pre-clerkship students to investigate the neurosciences in their future careers through career and live patient sessions
II. Project rationale:
We face a shortage of neurologists to treat an increasing number of neurologic patients. Nonprocedural specialties, like neurology, experience difficulties attracting US medical students [Freeman] and they perceive neurology as the most difficult specialty [Zinchuk]. It's estimated that the supply of neurologists will fall 20% below demand by 2020 [Bradley].

The most powerful tool used to diagnose and manage patients with neurologic complaints is neuroanatomical localization after performing a history and physical exam. This is the foundation for Clinical Neurology and can help avoid misdiagnoses and unnecessary tests [Roberts; Gurbani; Mondelli]. Use of acting learning methods has been recommended in the literature as a key strategy to overcoming "neurophobia"[Alimoglu; Lim]. Our primary aim is to demystify neurology through tying clinical teaching solidly and repeatedly into neuroanatomical localization with a localization tool and through active, learner-centered, localization laboratory sessions.
In addition to increasing comfort and facility with neurology in all learners, we also specifically aim to attract more learners into the field of neurosciences through highlighting the variety of attractive career paths. To this end, the second arm of our project consists of formulation of interactive sessions with both multidisciplinary teams of providers and the patients for whom they care.
Our hypothesis is that continual grounding into neuroanatomical localization and increased patient and multidisciplinary team exposure will increase comfort with and inspiration to consider neurosciences; as measured by test scores and amount of students from Stanford eventually choosing careers in neurologic sciences.
III. Approach:
For the laboratory sessions, we have started with a review of the literature to look at the evidence for various active teaching methods within neurology. We will further hone in on best practices and refine our ideas through collaboration with medical educators locally at Stanford and nationallt. We will use this knowledge and expertise to guide creation of new learner-centered, flipped-classroom laboratory sessions on localization (1-2 sessions). Our current plan is 10-25 high yield cases.

The localization tool will be in the form of a gender neutral neurologic model with a superimposed 3D neuraxis that students can use to zoom in on to identify potential localizations for particular symptom patterns (ie in the form of a written/phone app/web application). Our goal is a format that can be incorporated widely into lectures and laboratory sessions and for use during independent study. We also plan to explore whether this tool may be of continued use to students during their eventual neurology clerkships. We will evaluate utility of the tool via solicitation of targeted

anonymous student feedback as well as comparing student test scores and course ratings before and after implementation.

To our second aim, we plan to develop a variety of patient and multidisciplinary provider sessions. Format may be either large group/panels or small group/lab type sessions with frequent switching. We may also consider a team-based learning (TBL) style format but using live patients, which has been shown to be highly effective as a teaching strategy in neurology [Alimoglu]. We will use the time allotted to draw from best practices locally and nationally (including educators, literature, and medical student focus groups) to decide on our final format. Some ideas:

- Neurosciences Career Panel to advertise the breadth/depth of neurosciences. Participants may include inpatient/outpatient neurologist, neurophysiologist, neurosurgeon, rehabilitation specialists (speech/cognitive/PT/OT), nurse, neuropsychologist, neuroradiologist, neuropathologist, neuro-industry, basic science researchers
- Neurosurgery Panel: show and tell because exposure to neurosurgery is limited during preclinical years currently. Surgeons may bring in videos of what they do in the operating room.
- Live patient sessions: invite patients to share their patient experience from presentation, diagnosis and treatment/recovery.
- Patient/provider sessions: either a panel or in several small groups with stations. Include a patient volunteer and a member of their care team (patient +PT; patient + their neurologist; patient + speech therapist etc) to highlight neuro exam findings and how that helps guide treatments.
- Ethical dilemmas in Neurology: Case based discussion with ethicist, clinician, allied health professional.

IV. Timeline and plan for implementation:
- Fall 2017-Spring 2018:
  o Review of literature/evidence and reach out to local and national educators for best practices. Consider medical student focus groups (clerkship students reflecting on pre-clerkship course) to accurately define need and gaps.
  o Develop labs using real cases seen at Stanford Neurosciences that are particularly high yield for localization and expose the students to the diversity of cases.
  o Develop paper to phone/web localization tool. Integrate tool into current lectures and labs.
  o Develop and finalize patient/provider panel/sessions using best practices as described in first bullet points.
- HHD 223 Winter Neuro Block Q5 2018.
  o Pilot localization lab + initial version of the localization tool
  o Pilot one multidisciplinary panel
- Spring 2018: use feedback and information gleaned from pilot sessions to further refine materials prior to full roll-out in HHD223 2018-2019 Q5 Neuro Block.

V. Anticipated work product
  o (1) new flipped classroom lab sessions, (2) new localization tool, (3) additional multidisciplinary career/live patient panels

VI. Evaluation plan
  o Pre- and post- tests for the localization lab; Student evaluations of pilot sessions, tool
  o Performance on Neuro block final exam and evaluations of the HHD block
  o Change in % of students selecting neuroscience sub-I, pursuing neurosciences

VII. Dissemination of results
  o Pre-Clerkship Directors' meetings
  o Abstracts for Annual Neuroscience Research Forum and Stanford Innovations in Medical Education Conference

VIII. Budget and justification

	Item	Justification	Amount
Compensation			
	5 clinical days	PI's time to develop design lab + panels	$3300
	5 clinical days	Co-PI time to develop lab + panels	$3300
		Total compensation:	**$6600**
Non-compensation			
	10 gift cards x $20 ea.	Gift cards to incentivize lab participation	$200
	1 stipend x $1200	Stipend for technical assistance with the tool development	$1200
		Textbook Copyright images	$2000
		Total non-comp:	**$1300**
		Total request:	**$10,000**

References

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