

## **Background/Motivation**

Since the publication of the Institute of Medicine's report "To Err is Human: building a Safer Health System" nearly 17 years ago, improving patient safety has been a national priority (1). The realization that most preventable errors can be attributed to systems issues and/or breakdowns in communication has led to the development of educational and organizational programs, and to the proliferation of simulation-based efforts. While simulation has been widely adopted in medical education throughout all levels of training there has been limited incorporation of systems-based teamwork training in the preclinical years. For example, *TeamSTEPPS®: Strategies and Tools to Enhance Performance and Patient Safety* (developed in collaboration the Agency for Healthcare Research and Quality and the Department of Defense) is an evidence-based resource for improving communication and teamwork skills that has been widely adopted by health care systems but is not a core component of most undergraduate medical education (UME) programs

Furthermore, the AAMC has noted a "performance gap" between medical school and residency training which has led to the development of Entrustable Professional Activities (EPAs) to serve as a guide for a certain set of behaviors students should be able to perform skillfully before graduation. Of note, several EPAs are closely linked to TeamSTEPPS® core content, particularly EPA 9: *Collaborate as a member of an interprofessional team*, EPA 10: *Recognize a patient requiring urgent and emergent care and initiate evaluation and treatment*, and EPA 13: *Identify system failures and contribute to a culture of safety and improvement*. Therefore, acquiring TeamSTEPPS® skills may advance "entrustability" at many levels.

High fidelity patient simulation (HFPS) combined with TeamSTEPPS may provide an opportunity for pre-clerkship medical students to be introduced to important systems factors concepts and to strategies that improve communication and foster a culture of patient safety. Previous work has shown that teamwork and communication skills can be improved in first year medical students (M1s) (2), but whether these skills are transferred into the second year and beyond remains unknown. Student performance and perceptual data within our curriculum indicate a lack of team dynamics in groups of second year medical students (M2s) and a higher incidence of medical errors occur more frequently in groups that exhibit poor teamwork skills. This suggests that changes to the current instructional approach may be necessary to facilitate sustained behavioral changes.

The **hypothesis** of the proposed study is that the strategic and intentional teaching of TeamSTEPPS® content during M1s and M2s HFPS will result in effective teamwork and communication skills development and instill a culture of patient safety awareness at an early career stage. The **aims** of the proposed study are:

1. Integrate relevant TeamSTEPPS® content into existing first year and second year HFPS ("TS-HFPS") activities to promote sustained and effective teamwork skills and a culture of patient safety.
2. Assess the impact of early TS-HFPS instructions on students' skills at various time points in years 1 and 2 and compare student attitudes, performance, and perception.
3. Evaluate whether the early introduction of TS-HFPSs is associated with the timing and level of entrustment for relevant EPAs.

## **Research Plan**

The research plan is based upon the framework of utilizing deliberate practice to achieve effective and sustained teamwork and communication skills in pre-clerkship students at the University of Central Florida College of Medicine (COM). This is a cohort study with a historical control group involving three COM classes of medical students, the Class of 2018, 2019, and 2020. The Class of 2020 will be introduced to TeamSTEPPS® tools and participate in TS-HFPS during both their M1 and M2 year. This will occur by modifying existing HFPS (integrating TeamSTEPPS® in these) during the Structure and Function (M1) and existing HFPS during the P-modules (M2). The outcomes of this intervention will be evaluated using the Kirkpatrick Four Level Model.

## **Intervention**

In the M1 year, students participate in four different HFPS activities during the Structure and Function module. In the first week of the module, students will have 1 HFPS to provide relevance for the TeamSTEPPS® training. During the second week, a 2 hour session on TeamSTEPPS® tools provided by Dr. Kalidindi will be provided to orient students to tools they may use during the remaining HFPS activities. During the debriefing sessions of the next 3 HFPS activities, faculty facilitators will emphasize TeamSTEPPS® tools and terminology utilized by the team and/or present possible tools. In the second year, a 1 hour refresher on the TeamSTEPPS® tools will be provided to students before participation in 4 HFPS. Again, faculty facilitators will emphasize TeamSTEPPS® tools and terminology in debriefing sessions.

## **Participants**

There will be three groups included in the initial study and the schematic is shown in the Table. The Class of 2018 will serve as a historical control with no intervention (NI), while the Class of 2019 will have the intervention (I) starting with the second year. The Class of 2020 will receive the intervention in both the first and second year. Every HFPS session has been video recorded and will be used for analysis.

	Year 1	Year 2	Years of Intervention	Assessment
Class of 2020	I	I	2	Focus group; Pre and Post-test (T-TAQ); TPOT
Class of 2019	NI	I	1	Focus group; Pre and Post-test (T-TAQ); TPOT
Class of 2018	NI	NI	0	Focus group; TPOT
I = Intervention, NI = No intervention, T-TAQ = Teamwork Attitudes Questionnaire, TPOT = Team Performance Observation Tool				

### Assessment

The goal of the project is to evaluate the intervention by using the Kirkpatrick Model. To address Level 1: Reaction, focus groups will be utilized for all classes to ascertain student perception. For Level 2: Learning, a validated questionnaire (Teamwork Attitudes Questionnaire T-TAQ) from TeamSTEPPS® will be provided before the first simulation of each year and after the last one as a pre- and post-test. For Level 3: Behavior, a validated Team Performance Observation Tool (TPOT) from the TeamSTEPPS® program will be utilized to analyze each simulation video by two blinded and independent raters. The TeamSTEPPS® instruments will be modified to meet the level of the learner. In order to address Level 4: Results, the study may need to be expanded into Year 3 of our curriculum, particularly during the Capstone, to determine improvement in the outcome of teamwork and communication skills by comparing performances from Year 3 to Year 1.

### Justification of Financial Support

Item(s)	Rationale	Rate	Costs
2 Blinded, Independent Raters	Evaluate performance using TPOT	\$40 an hour (90 hours/rater)	\$7200
3 Focus Groups and food	Student perception data	10 students per year (3 years; \$20 compensation); \$100 for food	\$900
Transcription Costs		0.17 cents/line (Three 60 min focus groups)	\$800
Statistical Consultation		\$150/hour for 5 hours	\$750
Digital Recorder		\$50	\$50
<b>Total Budget:</b>			<b>\$9700</b>

### Expected Deliverables

1. MedEd Portal - Incorporation of triggers or stimuli into HFPS designed for pre-clerkship medical students is an innovation that could be used at multiple institutions.
2. Manuscript – Introducing TeamSTEPPS training into the pre-clerkship medical education is novel to our knowledge, especially across both years. This manuscript could be submitted to Patient Safety journals or simulations journal.
3. Grant application – The pilot study should provide key data in applying for external funding from foundations such as the Macy Foundation or from the Agency for Healthcare Research and Quality.

### Team Membership

Name	Title (Department)	Role
David M. Harris, PhD	Associate Prof. of Physiology (Medical Education)	Module Director; Sim researcher
Laurel Gorman, PhD	Assistant Prof of Pharmacology (Medical Education)	Co-Module Director; Sim researcher
Caridad Hernandez, MD	Associate Prof of Int. Medicine (Internal Medicine)	Module Director
Analia Castiglioni, MD	Associate Prof of Int. Medicine (Internal Medicine)	Dir. of Clinical Skills and Sim Center
Shiva Kalidindi, MD	Pediatric Emergency Medicine (Pediatric Emer. Med, Nemours)	TeamSTEPPS Master Trainer

### How the Project addresses a Research Focus Area

The research focus area that this study addresses is the simulation concentration. The HFPS is the center piece for which the intervention, TeamSTEPPS® training, is focused around. Simulation, especially in the pre-clerkship years, is a hot topic and there is ample opportunity for studies ingrained in framework to advance the field. The formation of the team for this grant will hopefully also bring about further collaboration and integration of curricular content which could sprout into many other projects.

## **References**

1. Kohn L., Corrigan J, Donaldson MS. To Err is Human: Building a Safer Health Care System. Washington, DC: National Academy Press; 2000.
2. Reinemann J, LaBell K, Bellew C, Asmar A, Cendan J, Harris DM. Integration and Improvement of Teamwork Skills in First Year Medical Students by Using Physiology-Based High Fidelity Patient Simulations. Medical Science Educator, Dec. 2015.