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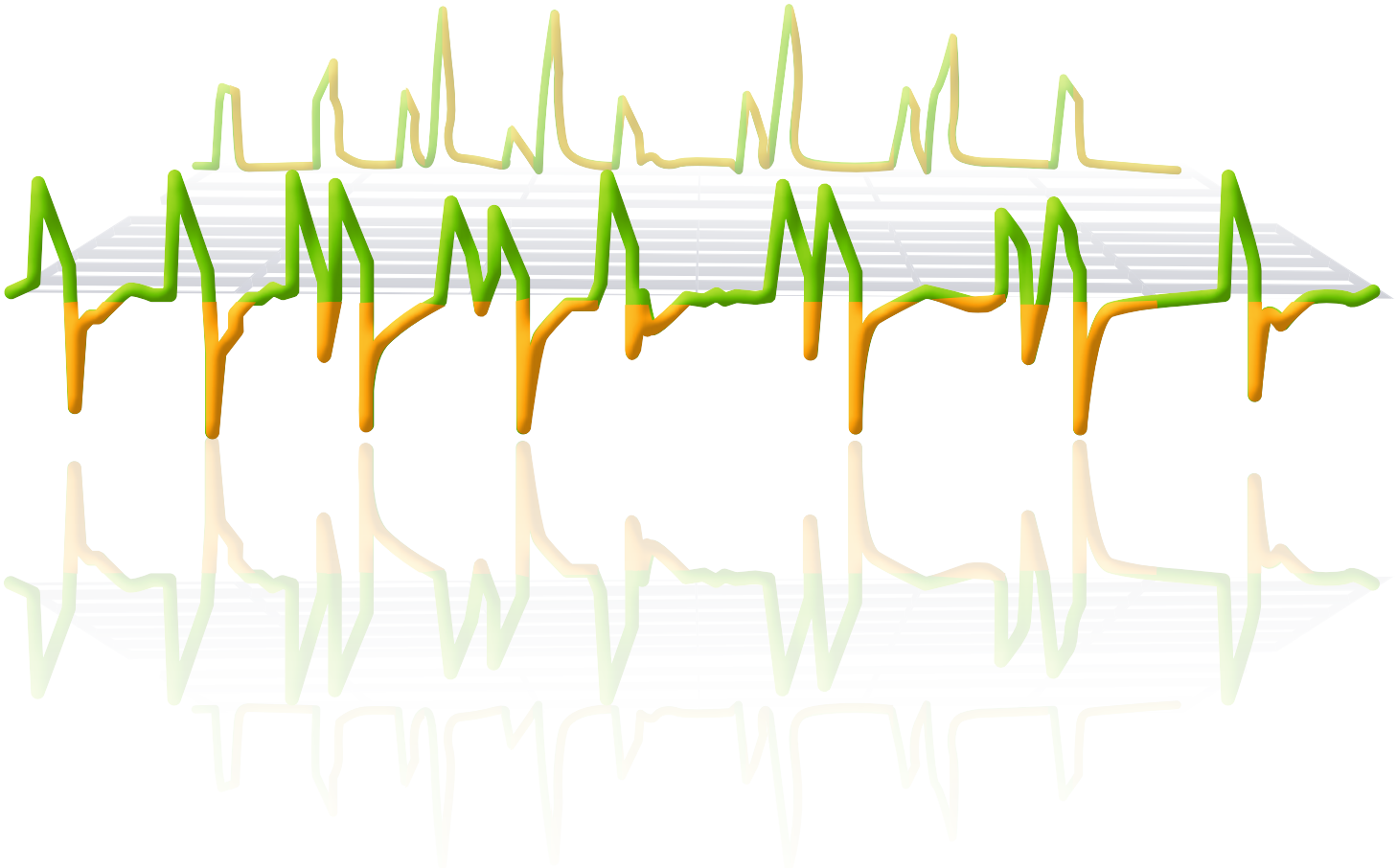
INNOVATIONS IN Fellowship Education

2021 Highlights Book



Art based on image from "Ventilator Education Response Team (VERT): A Novel, Interactive, Longitudinal Mechanical Ventilation Curriculum to Improve Fellow Skill and Confidence" page 4

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The following program was selected by the ATS Training Committee as the standout program in educational excellence this year. Mount Sinai Health System submitted the top innovations abstract for 2021.

The ATS would like to showcase the additional institutions who submitted an abstract to the 2021 Innovations in Fellowship Education program.

PROGRAM DETAILS

The American Thoracic Society greatly values a strong fellowship program as a means of academic and clinical success. To recognize programs that implement exceptional practices, the ATS Training Committee developed the Innovations in Fellowship Education program. All pulmonary, critical care, sleep, and allergy fellowship programs (adult and pediatric) were invited to submit abstracts showcasing a novel and innovative best practice.

Abstracts were reviewed and ranked by the ATS Training Committee based on the following criteria:

- Innovation: How unique is the educational program? What is new and different?
- Implementation/Sustainability: How was the program implemented and how effective was such implementation? Is this program sustainable?
- Transferability: How easily might this educational program be adopted by other fellowship programs?
- Outcomes: Are there reported outcomes or plans to measure them?

The goal of this program is to recognize fellowship programs that demonstrate educational excellence and to share these best practices with other programs.

TOP INNOVATION ABSTRACT OF 2021!

Icahn School of Medicine at Mount Sinai (Morningside/West/Beth Israel)

Ventilator Education Response Team (VERT): A Novel, Interactive, Longitudinal Mechanical Ventilation Curriculum to Improve Fellow Skill and Confidence

Abstract Authors: Deep Patadia, MD, MPH; Paru Patrawalla, MD

RATIONALE:

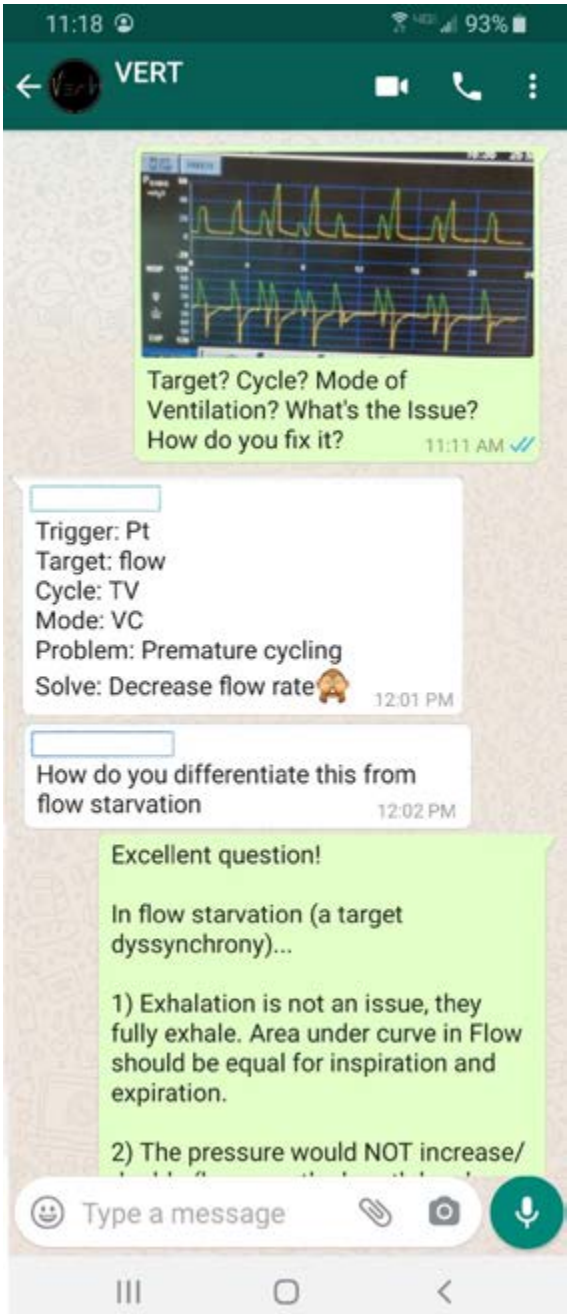
Pulmonary and Critical Care Medicine (PCCM) Fellows are required by the Accreditation Council for Graduate Medical Education to demonstrate competence in the interpretation and management of mechanical ventilation (MV). However, trainees are frequently dissatisfied with their MV training. We describe a novel, longitudinal MV curriculum using deliberate practice to increase the knowledge and confidence of first-year (F1) PCCM fellows.

METHODS:

F1 PCCM fellows attended an 8-hour interactive, simulation-based MV bootcamp led by a senior fellow in their first month of fellowship. Following the bootcamp, a WhatsApp group, an instant messaging system for mobile devices, entitled Ventilator Education Response Team (VERT) was developed for longitudinal deliberate practice. VERT was composed of F1 learners and a VERT leader, a senior PCCM fellow. The VERT leader would send MV case-based scenarios to the group, review F1 responses and then provide text or video explanations (Figure 1). F1s also sent real-time questions on VERT for group discussion. F1s completed a pre-bootcamp, post-bootcamp and 5-month follow-up survey to assess confidence in MV knowledge and skill.

RESULTS:

All F1 PCCM fellows (n=5) participated in the MV bootcamp and VERT. There was a 100% survey response rate. The learners demonstrated an improvement in confidence pre- and post-bootcamp in all areas - MV nomenclature, modes of ventilation, basic physiology, advanced pathophysiology and ventilator dyssynchrony using a 5-point Likert scale (Table 1). Confidence was retained in MV nomenclature, modes of ventilation, basic physiology, and dyssynchrony after 5 months use of VERT practice. However, there was skill decay in advanced MV pathophysiology. VERT improved F1 learner's confidence in MV (4 [4,4]), knowledge of ventilator physiology (4 [4,5]), and comfort adjusting a MV (4). Subjects found it



easy to ask MV related questions in VERT (5 [4,5]), the media highly engaging (5 [5,5]), and useful sending their own images regarding management for patient care (5 [4,5]). The subjects preferred a senior fellow as the VERT leader (5 [5,5]) compared to an attending (3 [3,3]) given a safe learning environment. The most common barrier to engaging in VERT was a busy clinical rotation. All the learners preferred to incorporate VERT in the training of future PCCM fellows (5 [5,5]).

CONCLUSION:

We found that a simulation-based MV bootcamp increased F1 confidence in MV and VERT supported skill retention in the majority of curricular areas. VERT is a novel instructional method, integrating WhatsApp to provide a longitudinal method for deliberate practice and a safe learning environment for early stage fellows. It allows for direct feedback and instant access to facilitate group learning. Further study should incorporate validated measures of competency assessment in MV.

Table 1. Level of Confidence in Various Topics of Mechanical Ventilation Among F1 PCCM fellows

	Pre-Bootcamp Median [IQR]	Post-Bootcamp Median [IQR]	5 months post-Bootcamp Median [IQR]
MV Nomenclature			
Terminology	4 [3,4]	4 [4,5]	5 [4,5]
Phases of Mechanical Breath	4 [3,4]	5 [5,5]	5 [4,5]
Knobology	3 [3,3]	4 [4,5]	4 [4,5]
Overall	3 [3,4]	5 [4,5]	5 [4,5]
Modes			
Volume Control A/C	3 [3,4]	4 [4,5]	4 [3,4]
Pressure Control A/C	3 [2,4]	4 [4,5]	4 [4,4]
PSV	3 [3,4]	5 [4,5]	4 [4,4]
PRVC	3 [3,4]	4 [4,5]	4 [3,4]
APRV	2 [1,3]	4 [3,4]	3 [2,3]
SIMV	2 [2,3]	3 [2,4]	3 [3,3]
Differences between Modes	4 [4,4]	5 [5,5]	4 [4,4]
Overall	3 [2,4]	4 [4,5]	4 [3,4]
Basic Physiology			
Loops	3 [3,4]	4 [4,5]	4 [3,4]
Peak/Plateau Pressure	3 [3,4]	4 [4,4]	4 [4,4]
Inspiratory/Expiratory Hold	4 [3,4]	4 [4,5]	4 [4,4]
Oxygenation	4 [4,4]	4 [4,5]	4 [4,4]
Ventilation	4 [3,4]	4 [4,5]	4 [4,4]
Oxygen Delivery Dissociation	3 [2,3]	4 [4,4]	3 [3,4]
Overall	4 [3,4]	4 [4,5]	4 [4,4]
Advanced Pathophysiology			
Auto-PEEP	3 [3,4]	4 [4,4]	4 [4,4]
Air Leak	3 [3,4]	4 [4,5]	4 [4,4]
VILI	3 [3,3]	4 [4,4]	3 [3,4]
Stress Index	3 [2,3]	4 [3,4]	3 [3,3]
Driving Pressure	3 [3,3]	4 [4,4]	3 [3,3]
Recruitment Maneuver	2 [2,3]	4 [3,4]	3 [3,3]
Management of ARDS	3 [3,4]	4 [4,4]	4 [4,4]
Management of Obstructive Lung Disease	3 [2,3]	4 [3,4]	3 [3,4]
Overall	3 [2.75,3]	4 [4,4]	3 [3,4]
Dyssynchrony			
Trigger dyssynchrony	2 [2,3]	4 [4,5]	4 [3,4]
Target dyssynchrony	2 [2,3]	4 [4,4]	4 [3,4]
Cycle dyssynchrony	2 [2,3]	4 [3,5]	4 [4,4]
Overall	2 [2,3]	4 [3.5,5]	4 [3,4]
Overall			
Comfort/Confidence with MV	2 [2,3]	4 [4,4]	4 [4,4]

Table 1. The level of comfort first year pulmonary and critical care fellows (n=5) have regarding various topics of mechanical ventilation prior to mechanical ventilator bootcamp, post-bootcamp, and 5 months of VERT. Likert scale: 1= Not Confident and 5 = Very Confident

A/C assist-control, *APRV* airway pressure release ventilation, *ARDS* acute respiratory distress syndrome, *F1* first year, *IQR* interquartile range, *MV* mechanical ventilator, *PCCM* pulmonary and critical care medicine, *PEEP* positive end-expiratory pressure, PRVC pressure regulated volume control, PSV pressure support ventilation, *SIMV* synchronized intermittent mandatory ventilation, *VILI* ventilator induced lung injury, *VERT* ventilator education response team

Metrohealth at Case Western Reserve University

Fellows Escap-ED: A Novel Amalgam of Gamification and Simulation

Abstract Authors: Faiza Khalid, MD[1], Ishan Lalani, MD[1], Ziad Shaman, MD[2]

[1]Fellow, Department of pulmonary, critical care and sleep medicine, Metrohealth at Case western reserve university, Cleveland, OH. [2]Associate Professor, Department of pulmonary, critical care and sleep medicine, Metrohealth at Case western reserve university, Cleveland, OH.

RATIONALE:

Clinical trainees require practice and education to master communication, culminate team building and procedural skills, especially in time constrained situations. Gamification in medical education is not an alien concept, there are quiz-based formats to test medical knowledge like medical jeopardy. Additionally, medical training programs utilize various simulation-based learning modules to engage trainees in real-life patient scenarios. Although, each teaching technique has its own advantages, we sought to combine both simulation-based learning and concept of gamification to assess medical knowledge and cooperative learning among our first year pulmonary and critical care fellows.

The objective of the escape room exercise was to link cooperative learning, application of knowledge and trainee wellness activity using the concept of gamification. We designed the escape room to test four major domains: clinical knowledge, procedural skills, research/statistic, and miscellaneous practical skills pertinent to first year of pulmonary and critical care fellowship training.

METHODS:

Three first-year fellows were emailed educational material to review prior to the activity along with a pre-test questionnaire. The escape room exercise was held in our simulation center. Before starting the activity, the fellows were briefed on the patient scenario; a 55-year-old patient with hypoxic respiratory failure requiring intubation and mechanical ventilation in the emergency department who is now in medical intensive care unit. The participants were to gather clues in the escape room that would assist them in reaching the diagnosis and escape in 60 minutes. The simulated patient was a high-fidelity mannequin. The simulation center staff was responsible for operating the mannequin and displaying time and clues on the monitors inside the escape room.

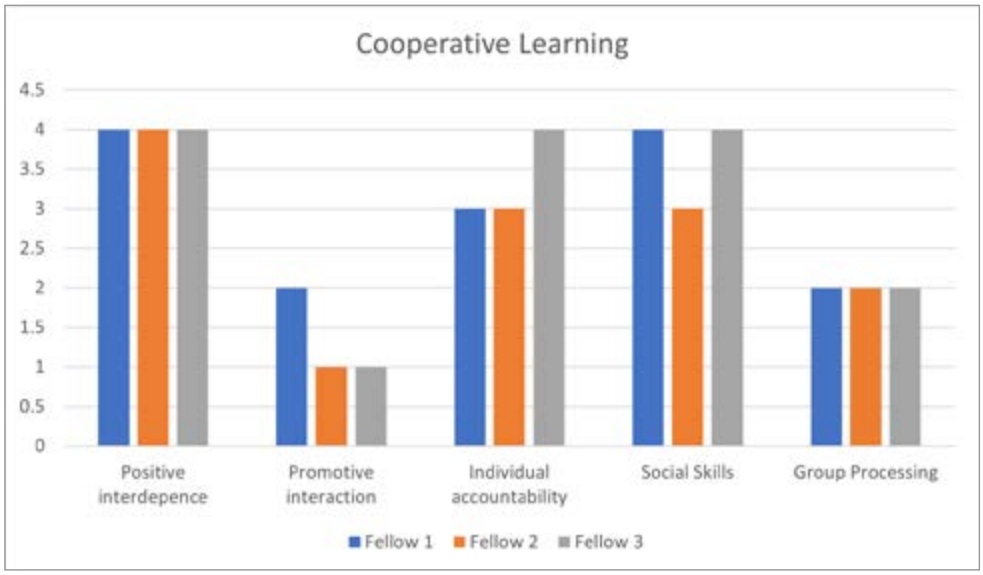
Our simulated patient had drug-induced diffuse alveolar hemorrhage complicated by acute respiratory distress syndrome. In the escape room, alphabet and number coded locks and grids, puzzles and riddles were used as clues. Hypothetical patient reports, with hidden clues, that included imaging were also provided. Questions related to research

Table 1: Cooperative Learning Assessment

Five Pillars of Co-operative Learning					
	Positive Interdependence (max score = 4) "We need contributions from each member of team to succeed."	Face to face, promotive interaction (max score = 4) "How I think, talk and act towards my team members will influence how well we perform."	Individual accountability (max score = 4) "Although my team members can help with the assigned task, my individual performance will shape my grade."	Social skills (max score = 4) "Working effectively together as a team means that I need to improve my interpersonal skills."	Group Processing (max score = 4) "Our team has to reflect on its performance and think together about how we might improve."
Score Each Domain					
Not acceptable (1)					
Needs development (2)					
Competent (3)					
Excellent (4)					

and statistics also served as clues. Procedural skills such as performing endotracheal tube exchange for a simulated cuff leak and assembly of a bronchoscope were evaluated and in turn made the team 'win' a clue. Identification of patient safety issues and filing a safety event report as part of practical knowledge was also included. A post-test questionnaire based on components of cooperative learning (Table 1) was administered at the end of the activity.

Graph 1: Scoring of individual components of cooperative learning.



RESULTS:

In the pre-test questionnaire two fellows rated their communication skills as 'need development' and one fellow rated it as 'competent' on a 4-point Likert scale (not acceptable, needs development, competent and excellent). All three fellows stated that they find the concept of simulation helpful, but it can be better organized.

All fellows found the activity an excellent tool to improve team building skills. On the post-test questionnaire, the fellows identified promotive interaction and group processing as areas that need most improvement. (Graph 1)

CONCLUSION:

Gamification is making a big impact across different fields, with education being one of the first to introduce games as a complement to learning. However, the gamification of medical education has struggled to gain more traction. An escape room themed simulation has an advantage that it can be customized to varying levels of difficulty depending on the year of clinical training and participants find it more stimulating and engaging than traditional simulation-based patient cases. We aim to replicate this activity with the fellows at the start of second year of clinical training and assess progression of team building skills. Escape room themed simulation is a novel concept in medical education and can be replicated with different patient scenarios and is generally well received among clinical trainees.

Detroit Medical Center- Wayne State University

A Standardized Curriculum for Chest CT Scan Interpretation for a Pulmonary Critical Care Medicine Fellowship

Abstract Authors: Abdelaziz Mohamed, MD; Aryan Shiari, MD; Divya Venkat, MD; Chetna Jinjuvadia, MD; Ayman Soubani, MD; Sarah J. Lee, MD; Abdulghani Sankari, MD

BACKGROUND/INTRODUCTION:

Racial and ethnic disparities in access to chest CT has led to delayed diagnoses and management of life-threatening diseases. Contributing to this problem is a lack of sufficient providers with the ability to accurately interpret imaging in underserved areas since the traditional educational model requires extensive years of specialized learning under apprenticeship1–3. Increasing capacity can include training pulmonary and critical medicine (PCCM) physicians but no standardized curriculum on chest CT exists. After a needs assessment survey, a blended simulation curriculum with a systematic competency checklist was created for a PCCM fellowship. Using case-based simulation may allow better retention of comprehensive knowledge and skills compared to the traditional model of didactic learning alone4–6. This is a pretest/posttest evaluation study of the impact of a pilot curriculum on a single institution's PCCM and CCM fellowship trainees' knowledge and skills on chest CT diagnostic approach and interpretation.

STUDY DESIGN/METHODOLOGY:

For the needs assessment survey, the PCCM faculty identified five high-yield but challenging diseases that rely on accurate chest CT interpretation. The simulation scenarios, educational content, and assessments were focused on addressing these gaps. The curriculum involves serial knowledge and skill assessments (Table 1).

To generate the knowledge assessment tool, 40 multiple-choice questions (MCQs) were administered to a pool of attendings and learners of varied levels of training (n=13). Then, the difficulty index and a discrimination index were calculated for each question. Internal consistency reliability was calculated using item-total correlation and Cronbach alpha. Content validity was determined by unanimous agreement of three independent experts. 15 MCQs met the set criteria.

RESULTS:

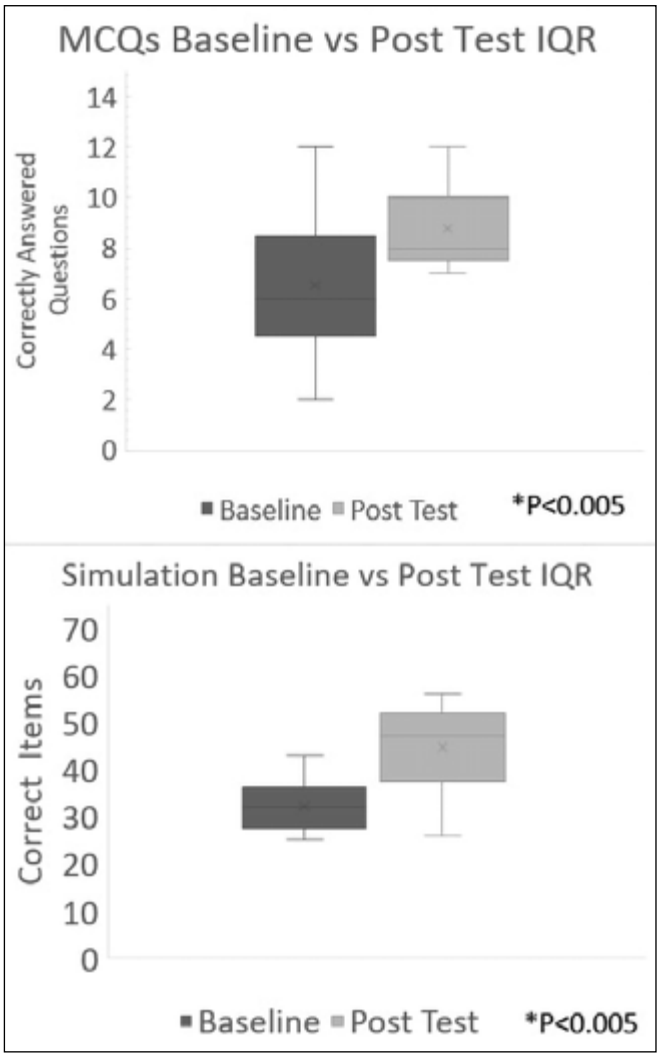
In July 2020, ten first and second-year (PGY IV-V) PCCM fellows completed baseline assessments. All fellows spent 1 hour or more on the video-modules and the online course. Usage of the video modules was monitored, so that post-assessment was administered only after learners completed viewing the series. The average MCQ score improved from 6±3 to 9±2 out of a maximum of 15 questions, (p= 0.002), while the simulation score improved from 30.7 ± 4 to 44.7 ± 9.9 out of 75 items (p=0.002).

Table 1: Learners underwent the following steps in the curriculum in chronologic order:
a) A 15-item MCQ test to assess baseline medical knowledge.
b) Five case-scenario simulations with evaluations via competency checklists to assess baseline skills.
c) Education, which included post-simulation debriefing, a set of video-modules developed with a thoracic radiologist and pulmonologist, an interactive webinar on interstitial lung diseases, and recommended list of mobile applications.
d) A MCQ post-test.
e) A post-test skill evaluation using case-scenario simulations.

Table 2. Knowledge Assessment Tool.
Among the 40 MCQs, 15 met the difficulty index of 20 to 80 and discrimination index of 0.3 to 0.8. The Cronbach alpha was 0.80

DISCUSSION AND CONCLUSION:

This standardized radiology simulation curriculum improves learner's performance with knowledge tests and competency skill checklists allowed educators to objectively assess and ameliorate learning gaps among PCCM fellows, which may help reduce healthcare disparity in accurately interpreting chest CT images.



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Nationwide Children's Hospital

Establishment of a Sustainable and Effective Journal Club Curriculum

Abstract Authors: Eric S. Mull DO, MA; Lisa Ulrich MD

Fellowship Director: Dr. Stephen Kirkby, MD, Pediatric Pulmonology Nationwide Children's Hospital Columbus, Ohio; The Ohio State University Columbus, Ohio

Assistant Fellowship Director: Dr. Lisa Ulrich, Pediatric Pulmonology Nationwide Children's Hospital Columbus, Ohio; The Ohio State University Columbus, Ohio

BACKGROUND/ RATIONALE:

Journal clubs are an important tool for medical professionals to stay up to date with evidence-based medicine (EBM) and promote their critical thinking skills related to appraising peer reviewed articles. With the vast amount of literature being published daily, an established journal club allows for pertinent EBM to be conveyed to a group of healthcare providers in an efficient manner. Our pulmonary program did not have an established, formal journal club program. The current fellows identified this absence as an area of potential improvement for the 2020-2021 fellowship year. We set a goal to establish a sustainable journal club curriculum within our didactics program that could be replicated in any other fellowship program.

METHODS:

Prior to initiation of the project, a survey was completed by the fellows and faculty assessing their satisfaction with previous journal club sessions. Five newly formatted journal club sessions were scheduled throughout the academic year. Each session has an assigned fellow and faculty lead. Prior to each session, the fellow is given documents to optimize the session's flow and educational content. These resources include: documents detailing expectations and format, tables explaining different types of adult learners, methods for appropriate article selection, and a Journal Interpretation Summary Tool (JIST). The JIST is a model that organizes the major elements of a selected study, allowing the facilitator and participants to navigate through key information and guide the journal club discussion. The JIST consist of four main elements: background, study overview, Patient/Intervention/Comparison/Outcome (PICO) method of critique, and significant implications in clinical practice. This model was first used at Brigham and Women's Hospital, Department of Pharmacy. We obtained permission to use the tool prior to the implementation at NCH. Each session is assigned a clinical topic, based on the faculty's area of expertise. The faculty and fellow select a relevant, recently published article, disseminate it to the division with the completed JIST tool, and present an interpretation to the group in PowerPoint format. Time was allotted at the end of each session to briefly discuss topics including other relevant current research and best practices. Sessions lasted an hour and were conducted virtually due to the COVID-19 pandemic. Audience members participated verbally and through the chat function on the video conference. Surveys will be distributed after each session to all participants.

RESULTS:

Four out of five fellows (80%) and fifteen of eighteen faculty members (83%) participated in the pre-survey. Results highlighted the need for a formalized journal club curriculum. Both fellows and faculty reported a more formal program would facilitate discussion (100%) and potentially change clinical practice (36.8% yes, 63.2% maybe, 0% no). At the time of this publication one session has been completed. The session was well attended by both faculty and fellows. Verbal feedback was positive from the session. Post-session formal survey results have not yet been evaluated.

CONCLUSION:

Although still in the early phases of the project, preliminary data supports the need for a formalized journal club curriculum in our pulmonary fellowship program. By utilizing a structured format with frequent, formal evaluation of the program, we plan to create a sustainable journal club curriculum that will enhance our fellowship didactic program for years to come. Ultimately, we plan to make this curriculum easy to replicate in any fellowship program to promote ongoing EBM education for fellows across all disciplines.

Continued on following page

BACKGROUND – THE STUDY QUESTION?	
Background	• Provide general background on the topic or therapy • Describe current practices or standards of care in regard to the therapy or disease state involved
Previous trials	• List Major applicable trials: including reference and citation only • Be prepared to provide details (PIES) of these trials
Why this study?	• Explain what this study will provide to clinical practice
GENERAL STUDY OVERVIEW	
Title/Citation	• Provide full title and journal citation
Funding	• Who funded the trial if any • If funded, provide details on the involvement of the funding body
Null Hypothesis	• There is no difference between treatment 'X' and treatment 'Y' with respect to the primary endpoints of 'Z'
Trial design	• Randomized, controlled, blinded, prospective
Objectives	• Generally located just before the Methods section of the article • The objective may differ from the primary endpoints
Enrollment	• How many patients were randomized?
METHODS (only list pertinent trial info in this section: refer to trial for further details)	
Inclusion criteria	• Bullet point inclusion criteria
Exclusion criteria	• Bullet point exclusion criteria
Interventions	• Brief review the intervention
Endpoints	• Primary Endpoint • Secondary Endpoint
Statistical analyses	• Bullet the statistical test used for each endpoint and type of data

Continued on following page

RESULTS	
Monitoring	• List the predefined monitoring parameters
Enrollment	• How many patients were enrolled • How many patients were excluded for not meeting the inclusion/exclusion criteria • How many patients randomized to each group • How many patients dropped out
Baseline characteristics	• Refer the group to the table in the article with the baseline characteristics (often times table 1) • May make a brief remark on the key characteristics on this from, but for the most part the group should look at the table in the trial
Outcomes to the primary endpoint	• Report the outcome with statistical results
Outcomes to the secondary endpoint	• Report the outcome with statistical results
Outcomes to the subgroup analysis	• Report the outcome with statistical results
AUTHORS' CONCLUSIONS	
Brief description of the authors view and conclusion of the trial and outcomes STOP at this point and open the floor to discussion for the following section as you step by step through the PICO method of Critically Evaluating Clinical Trials	
GENERALIZABILITY/CRITIQUE/DISCUSSION	
Patient Population	Serves as a guide for clinical applicability: ❑ Evaluate inclusion/exclusion criteria ❑ Evaluate that patient characteristics are representative of clinical practice (generally table 1 of most studies)
Intervention	❑ Is the intervention being studied against the current standard of practice? ❑ Has the intervention been previously studied?
Comparison	❑ What is main alternative being considered, if any?
Outcomes	❑ Is the primary outcome clinical relevant? ❑ If a surrogate outcome is used, is there a clear association with a hard clinical outcome? ❑ Is a composite outcome used? If so did previous trials used the same composite outcome?
Statistics	❑ Is the assumption for the rate of the primary outcome based off literature in the same patient population? ❑ Is the effect size assumptions appropriate based off prior studies? ○ Relative Risk Reduction ○ Absolute Risk Reduction ❑ Are the statistical test used to evaluate the data appropriate? ○ Nominal ○ Ordinal ○ Continuous
Leader's Conclusion	
The leader's conclusion should be the leaders personal take from the article	

*Template message (this is to be deleted for journal club): This is to serve as a template for your journal club handout. This should not exceed one page (front and back) upon completion, as all attendees are to have read the article prior to JC.