Fiscal Vear	FY 2017	Task Last Undated:	EV 02/05/2018
PI Name:	Yule. Steven J. Ph.D.	Task Dast Opuated.	1102/03/2010
Den : 4 T: 4	Developing and Validating Specific Medical Ev	vent Management Trainin	ng Protocols for Flight Crews on Deep Space,
Project Title:	Long-Duration Space Exploration Missions	C	
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline Element/Subdiscipline:	NSBRIHuman Factors and Performance Tear	n	
Joint Agency Name:	Techl	Port:	No
Human Research Program Elements:	(1) HFBP:Human Factors & Behavioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) HSIA:Risk of Adverse Outcomes Due to Inadequate Human Systems Integration Architecture		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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City:	Boston	State:	MA
Zip Code:	02115-6110	Congressional District:	7
Comments:			
Project Type:	Ground	Solicitation / Funding Source:	2015-16 HERO NNJ15ZSA001N-Crew Health (FLAGSHIP, NSBRI, OMNIBUS). Appendix A-Crew Health, Appendix B-NSBRI, Appendix C-Omnibus
Start Date:	06/01/2016	End Date:	05/31/2017
No. of Post Docs:	1	No. of PhD Degrees:	0
No. of PhD Candidates:	0	No. of Master' Degrees:	0
No. of Master's Candidates:	0 No.	of Bachelor's Degrees:	0
No. of Bachelor's Candidates:	0	Monitoring Center:	NSBRI
Contact Monitor:		<b>Contact Phone:</b>	
Contact Email:			
Flight Program:			
Flight Assignment:	NOTE: Element change to Human Factors & Behavioral Performance; previously Space Human Factors & Habitability (Ed., 1/19/17)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Lipsitz, Stuart Sc.D. (Brigham And Women's Hospital/Harvard Medical School) Pozner, Charles M.D. (Brigham And Women's Hospital) Doyle, Thomas Ph.D. (Non-U.S. Co-PI: McMaster University, Canada) Musson, David M.D., Ph.D. (Non-U.S. Co-PI: Northern Ontario School of Medicine)		
Grant/Contract No.:	NCC 9-58-HFP04501		
Performance Goal No.:			

Task Description:	<ul> <li>Original Project aims and objectives: The success of the next phase of space exploration is dependent on the ability of training programs to prepare crews to manage a range of events, medical and technical, which many occur during spaceflight. Long-duration exploration missions (LDEMs) will require crewmembers to be more autonomous than on previous missions, making the development of countermeasures to mitigate the effects of n-flight medical events essential to both survival and mission success. In line with the research topic, "Operationalize Customized Refresher and Just-1-flime Training Products for Deep Space, Long Duration Spaceflight Crews," the project that two specific aims to add to knowledge about the risk of team performance errors resulting from a lack of medical focused non-technical skills, as follows:</li> <li>Specific aim 1: Identify objective measures of non-technical skills that enhance crew management of in-flight medical emergencies:</li> <li>Specific aim 2: Develop a simulated spacecraft medical bay, and run a series of simulation scenarios to measure crew behavior during high acuity. Jow frequency medical emergencies:</li> <li>Da ochive these aims, we recruited a panel OZ experts from the fields of Space Medicine, Teamwork, Human Factors, and Emergency Medicine. They participated in online takes as well as a 2-day in person panel meeting at the lumar and Planearty Institute. Houston, This study was exploratory in nature, as team performance during medical emergencies in motivation with wave exploration in motivation study was exploratory in nature, as team performation study was exploration in the duration representation of specific behaviors reference from developing similar tools in other industrise and in priori study, supporting arew non-technical skills in a dilbrare and strategic fashino. The project adopted a quasi-experimental design that allowed to to test the hypothesis that it spossible to identify a unique set of objective measures for orew on-technica</li></ul>
Rationale for HRP Directed Research:	
	The benefits gained from the development of the objective measures and simulation scenarios have Earth applications to other teams working in rural and remote settings, such as military, marine, and industrial applications where limited
Research Impact/Earth Benefits:	onsite expertise and reliance on tele-medical support are characteristic. For example, in maritime and military teams medical events occur sporadically and cannot always be managed by specifically trained personnel such as trauma teams. Therefore, equipping non-medical teams with the essential non-technical skills for medical management can greatly enhance outcomes for affected personnel. The benefits of these project outcomes also extend to dedicated health care teams operating under rare and stressful situations, such as those dealing with mass casualty events.

Task Progress:	<ol> <li>Work Package 1: Identifying objective measures of non-technical skills:</li> <li>WP1a: Identify preliminary set of astronaut non-technical skills:          <ul> <li>Completed a comprehensive review of both peer-reviewed and non peer-reviewed publications on NTS for managing medical emergencies in space.</li> </ul> </li> </ol>
	1.2 WP1b: Delphi process with expert panel: • Recruited 28 experts from the fields of Space Medicine, Teamwork training in Space, Astronauts, Human Factors and Psychology, and Emergency Medicine; • Conducted a one and a half daylong meeting at the Lunar and Planetary Institute, University Space Research Association (USRA), Houston, on Nov 3-4, 2016; • Before the meeting, panel members completed an online survey to rate the 30 medical events on three parameters: impact on mission success, survivability, and role of non-technical skills in management; • During meeting, we identified: 4 scenarios to simulate; Key behaviors crew should demonstrate to respond to those events to identify the NTS taxonomy; Space context features; Medical capability for LDEMs; Challenges likely to be encountered on LDEMs; other LDEM specific features that will be relevant to in-flight medical events and might influence NTS of the crew; Measurement scale for the rating tool; the retention and decay of training with need for just-in-time training.
	1.3 WP1c: Develop prototype measurement tool: • Developed the measurement approach for the rating scale .
	2) Work Package 2: Develop three spacecraft medical bay simulations.
	2.1 WP2a: Design a spacecraft medical bay simulation platform: • Designed and built the medical bay simulation platform based on the CHeCS manual and ISS models; • Set up a segment of MCC for filming interactions of the in-flight crew with the MCC staff, particularly with the flight surgeon, to focus on the key NTS required for effective communication with the ground; • Set up AV functionality for medical bay and MCC simulator.
	2.2 WP2b: Modify existing medical simulations to the spaceflight context: • Storyboarded the 4 identified medical scenarios.
	<ul> <li>2.3 WP2c: Film space emergency micro-scenarios series: • Identified actors to play the role of in-flight crew and MCC based flight surgeon to reflect a multicultural crew of 4 astronauts; • Filmed the scenarios in 360-degree and 2D aspects;</li> <li>• The process of creating 16 micro scenarios from these 4 videos to conduct a reliability study in ongoing.</li> </ul>
	2.4 WP2d: Reliability study and psychometric testing: • Developed a web-based secure application to host videos for guiding the raters to rate the videos for the NTS behaviors; • The process of testing the appropriateness of the tool and observability of behavior observations has commenced with the project team and we will then extend to our expert panel members. This will be conducted online using the web-based platform developed.
Bibliography Type:	Description: (Last Updated: 11/09/2023)
Articles in Peer-reviewed Journals	Robertson JM, Dias RD, Gupta A, Marshburn T, Lipsitz SR, Pozner CN, Doyle TE, Smink DS, Musson DM, Yule S. "Medical event management for future deep space exploration missions to Mars." J Surg Res. 2020 Feb;246:305-14. Epub 2019 Nov 12. https://doi.org/10.1016/j.jss.2019.09.065 ; PMID: 31731248 , Feb-2020