

Fiscal Year:	FY 2014	Task Last Updated:	FY 10/17/2014
PI Name:	Ebert, Douglas Ph.D.		
Project Title:	Clinical Outcome Metrics for Optimization of Robust Training		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	NSBRI--Smart Medical Systems and Technology Team		
Joint Agency Name:	TechPort:	No	
Human Research Program Elements:	(1) ExMC :Exploration Medical Capabilities		
Human Research Program Risks:	(1) Medical Conditions :Risk of Adverse Health Outcomes and Decrements in Performance Due to Medical Conditions that occur in Mission, as well as Long Term Health Outcomes Due to Mission Exposures		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	77058	Congressional District:	36
Comments:			
Project Type:	GROUND	Solicitation / Funding Source:	2013 HERO NNJ13ZSA002N-Crew Health (FLAGSHIP & NSBRI)
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No. of Post Docs:	No. of PhD Degrees:		
No. of PhD Candidates:	No. of Master' Degrees:		
No. of Master's Candidates:	No. of Bachelor's Degrees:		
No. of Bachelor's Candidates:	Monitoring Center: NSBRI		
Contact Monitor:	Contact Phone:		
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Byrne, Vickie M.S. (Lockheed Martin) Cole, Richard M.D. (Self) Foy, Millennia Ph.D. (Wyle Laboratories, Inc.) Hurst, Victor Ph.D. (Wyle Laboratories, Inc.) Kerstman, Eric M.D. (Wyle Laboratories, Inc.)		
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Performance Goal Text:			

Task Description:	<p>This proposal addresses the NASA Research Announcement Human Exploration Research Opportunities (HERO), NNJ13ZSA002N-NSBRI Appendix B, Smart Medical Systems and Technology Team assignment. The objective of this research is to develop clinical outcome metrics and training tools for physician and non-physician crew medical officers (CMOs) in support of likely medical conditions. Multiple assessment techniques will be employed, centered around medical simulation studies which occur in 3, 6, and 12-month intervals after initial training (e.g. intubation, fundoscopic examination). These studies will systematically compare clinical outcomes of simulations performed by physician and non-physician crew medical officer (CMO) analogs for short-term outcome metrics. To enhance our understanding of long-term implications of imperfectly performed medical procedures, outcomes will be used as input to a modified version of the NASA Integrated Medical Model (IMM). Short- and long-term outcomes will be used to 1) define differences between physician and non-physician CMOs, 2) refine the outcome metrics themselves, and 3) refine or develop novel medical training products.</p> <p>There are multiple challenges to crew health care during extended spaceflight. Medical procedure performance could be affected by asynchronous communications (time delays), inability to evacuate, and prolonged time from initial CMO training to actual mission medical operations (including emergency and non-emergency care, diagnosis, and treatment). Exploration mission crews would ideally be equipped for autonomous medical care. In extreme resource-limited environments such as spaceflight, it is critical to consider not only the immediate outcome for each procedure, but also the consequences of a missed diagnosis or improperly performed procedure that will endure for the entire mission. For the proposed research, a two-tiered approach will be used. The first tier will examine the raw clinical outcome metrics by evaluating the performance of both physician and non-physicians in a medical simulation laboratory equipped with a human patient simulator (and other simulation tools as needed) to present the conditions and specific procedures being evaluated. The second tier will examine the mission-long impacts of procedural outcomes. A modified version of the IMM will be created which will accommodate diagnoses and procedures that are not 100% correct. Simulation output will become IMM input, with model results informing a novel set of outcome metrics which will demonstrate the true mission impact of medical procedure outcomes. Comparison of physician and non-physician outcomes in both tiers will directly address the value of including physician CMOs on Exploration missions. Based on results from both tiers, deficiencies in training procedures and tools will be identified, and training products refined to improve future outcomes. Our experienced multidisciplinary team includes physicians, medical trainers, remote guidance experts, and imaging/technology specialists, human factors experts, and a physician astronaut. The proposed research is expected to produce physician and non-physician clinical outcome metrics and medical condition training tools that will reduce the Human Research Program Exploration Medical Capabilities' "Risk of Unacceptable Health and Mission Outcomes Due to Limitations of In-flight Medical Capabilities". In addition to these benefits, the IMM enhancements would allow for the variable success of diagnostic and interventional procedures that could strengthen crew health predictions and expose unidentified medical resource gaps.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2014.
Bibliography Type:	Description: (Last Updated: 03/03/2016)