THE PATHWAY TO A SAFE AND EFFECTIVE MEDICATION FORMULARY FOR EXPLORATION SPACEFLIGHT

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PURPOSE

Exploration space missions pose several challenges to providing a comprehensive medication formulary designed to accommodate the size and space limitations of the spacecraft; while addressing the individual medications needs and preferences of the Crew; the negative outcome of a degrading inventory over time, the inability to resupply before expiration dates; and the need to properly forecast the best possible medication candidates to treat conditions that will occur in the future.

METHODS

The Pharmacotherapeutics Discipline has partnered with the Exploration Medical Capabilities (ExMC) Element to develop and propose a research pathway that is comprehensively focused on evidence-based models and theories, as well as on new diagnostic tools and treatments or preventive measures aimed at closure of the Med02 "Pharmacy" Gap; defined in the Human Research Program's (HRP) risk-based research strategy. The Med02 Gap promotes the challenge to identify a strategy to ensure that medications used to treat medical conditions during exploration space missions are available, safe, and effective. It is abundantly clear that pharmaceutical intervention is an essential component of risk management planning for astronaut healthcare during exploration space. However, the quandary still remains of how to assemble a formulary that is comprehensive enough to prevent or treat anticipated medical events; and is also chemically stable, safe, and robust enough to have sufficient potency to last for the duration of an exploration space mission. In cases where that is not possible, addressing this Gap requires exploration of novel drug development techniques, dosage forms, and dosage delivery platforms that enhance chemical stability as well as therapeutic effectiveness.

RESULTS

The proposed research pathway outlines the steps, processes, procedures, and a research portfolio aimed at identifying a capability that will provide a safe and effective pharmacy for any specific exploration Design Reference Mission (DRM). The proposed approach to building this research portfolio is to seek research projects that concentrate on four major focus areas; (1) Formulary selection, (2) Formulary potency and shelf life, (3) Formulary safety and toxicity, and (4) Novel technology and innovation such as portable real-time chemical analysis innovative drug therapies and dosage and delivery platforms.

CONCLUSION

The research pathway has been completed and presented to the HRP. In spring 2017, it is scheduled to be reviewed by a panel of pharmaceutical and clinical experts that will evaluate the scientific merit and operational feasibility of the research pathway, as well as make suggestions for any warranted additions or improvements. Once finalized, the ExMC Element will proceed with the execution of this research pathway with the goal of gathering as much data, and learning as much as possible, to provide a safe and effective pharmaceutical formulary for use during exploration missions.