

Space Medicine Exploration Medical Condition List

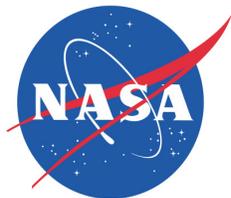
Space Medicine Division

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National Aeronautics and
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CHANGE LOG

Revision	Date	Originator	Description
Baseline	7/2009	S. Watkins	SMCCB baseline release
A	1/2011	Y. Barr, S. Watkins	Added NEA list; updated condition nomenclature

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1. INTRODUCTION

1.1. PURPOSE

The Human Research Program (HRP) has assigned the Exploration Medical Capability (ExMC) Element the responsibility of addressing the overarching risk of “the inability to adequately treat an ill or injured crewmember.” The Space Medicine Exploration Medical Condition List (SMEMCL) was created to define the set of medical conditions that are most likely to occur during any one of eight distinct mission profiles, as the first step in addressing the aforementioned risk. The list was derived from the International Space Station (ISS) Integrated Medical Group (IMG) Medical Checklist (JSC-48522), the Flight Data File Medical Checklist (JSC-48031), as well as from in-flight medical incidence data in the Lifetime Surveillance of Astronaut Health (LSAH) repository, and National Aeronautics and Space Administration (NASA) flight surgeon subject matter expertise. The list of conditions was further prioritized for the eight specific missions with the assistance of the ExMC Advisory Group, which is composed of flight surgeons and representatives from Space Medicine management, the astronaut office, and the National Space Biomedical Research Institute (NSBRI).

The purpose of the SMEMCL is to serve as an evidence-based foundation in determining which medical conditions could affect a crewmember during a given mission profile, which of those conditions would be of concern and require treatment, and for which conditions a gap in knowledge or technology development exists. This information will be used to focus research efforts and technology development.

The eight distinct mission profiles used as reference missions include the following:

- Orion ↔ ISS Transfer: 4 crewmembers (3 males, 1 female), 3 days, no extravehicular activities (EVAs)
- Lunar Sortie: 4 crewmembers (3 males, 1 female), 24 days, 4 EVAs/crewmember
- Lunar Outpost: 6 crewmembers (5 males, 1 female), 6 months, 60 EVAs/crewmember
- ISS Contingency Return: Illness or injury occurring on the ISS, which necessitates a contingency return from the ISS back to Earth, and requires en route medical care
- Lunar Sortie Contingency Return: Illness or injury occurring during a Lunar Sortie mission, which necessitates a contingency return from the Lunar surface back to Earth, and requires en route medical care
- Lunar Outpost Contingency Return: Illness or injury occurring during a Lunar Outpost mission, which necessitates a contingency return from the Lunar surface back to Earth, and requires en route medical care
- 144-Hour Depressurization Return: Illness or injury occurring during a contingency return from a Lunar mission, assuming a depressurized cabin and crewmembers in full pressurized suits for up to 144 hours
- Near Earth Asteroid (NEA): 4 crewmembers (3 males, 1 female), 386 days, TBD EVAs/crewmember

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The SMEMCL provides a clinical priority scale describing which medical conditions will be given adequate resources to treat. The clinical priority scale is defined as:

- 2 – Shall: The condition must be addressed by the medical system
- 1 – Should: If resources are available, it is desirable for the condition to be addressed by the medical system
- 0 – Not Addressed: The condition will not be addressed by the medical system

1.2. SCOPE

The SMEMCL is applicable to medical conditions that could occur in several exploration mission profiles. The intent of this list is to address conditions that occur as a consequence of human space flight and human habitation of space, in addition to injuries that result from hardware or vehicle failure. A condition was listed as “not addressed” if it is highly unlikely to occur, is expected to be engineered out, or limitations in medical training/hardware/consumables preclude its treatment. Pre-existing medical conditions were not included as it was assumed that a crewmember would carry a personal supply of pertinent medications and would not be utilizing shared medical resources.

The Orion ↔ ISS transfer mission profile encompasses the transit to and from Earth and ISS when the Orion vehicle is not docked to ISS. During the period the Orion vehicle is docked with ISS, the crewmembers become part of the ISS vehicle environment and would have access to the ISS Crew Health Care System (CHeCS). As such, the development of a medical condition list for the ISS mission profile is not within the scope of SMEMCL.

While the SMEMCL encompasses numerous medical conditions, it is an evolving document. As new evidence comes forth from space flight and analog environments, it is anticipated that additional conditions will be suggested for addition to the list.

1.3. CHANGE AUTHORITY/RESPONSIBILITY

Proposed changes to this document shall be submitted by a change request (CR) to the Space Medicine Configuration Control Board (SMCCB) for consideration and disposition.

All such requests will adhere to the Space Medicine configuration management change process.

2. DOCUMENTS

2.1. REFERENCE DOCUMENTS

- JSC-48031 Flight Data File Medical Checklist
- JSC-48522 International Space Station (ISS) Integrated Medical Group (IMG) Medical Checklist – ISS – All Expeditions

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Condition	(Orion ↔ ISS Transfer) Clinical Priority	(Lunar Sortie) Clinical Priority	(Lunar Outpost) Clinical Priority	(ISS Contingency) Clinical Priority	(Sortie Contingency) Clinical Priority	(Outpost Contingency) Clinical Priority	(144 Hour Depressurization) Clinical Priority	(NEA) Clinical Priority
Abdominal Injury	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	1 - Should
Allergic Reaction (Mild to Moderate)	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Altitude Sickness	1 - Should	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Anaphylaxis	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Anxiety	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall	2 - Shall
Aphthous Ulcer	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed
Back Injury	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	1 - Should	2 - Shall
Back Pain (Space Adaptation)	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	1 - Should	2 - Shall
Barotrauma (Ear/Sinus Block)	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Behavioral Emergency	0 - Not Addressed	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall
Burns	0 - Not Addressed	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	2 - Shall
Cardiogenic Shock	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed
Cellulitis	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall
Chest Injury/Pneumothorax	0 - Not Addressed	0 - Not Addressed	1 - Should	1 - Should	0 - Not Addressed	1 - Should	0 - Not Addressed	1 - Should

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Condition	(Orion ↔ ISS Transfer) Clinical Priority	(Lunar Sortie) Clinical Priority	(Lunar Outpost) Clinical Priority	(ISS Contingency) Clinical Priority	(Sortie Contingency) Clinical Priority	(Outpost Contingency) Clinical Priority	(144 Hour Depressurization) Clinical Priority	(NEA) Clinical Priority
Chest Pain/Angina	0 - Not Addressed	0 - Not Addressed	1 - Should	1 - Should	0 - Not Addressed	1 - Should	0 - Not Addressed	1 - Should
Choking/Obstructed Airway	0 - Not Addressed	0 - Not Addressed	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Compartment Syndrome	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed
Constipation (Space Adaptation)	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Cough (Upper Respiratory Infection/Bronchitis/Pneumonia)	1 - Should	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
De Novo Cardiac Arrhythmia	0 - Not Addressed	0 - Not Addressed	2 - Shall	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	2 - Shall
De Novo Hypertension	0 - Not Addressed	0 - Not Addressed	1 - Should	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	1 - Should
Decompression Sickness	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall
Dental - Cavity/Temporary Filling	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Dental - Crown Replacement	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Dental - Exposed Pulp/Pulpitis/Periapical Abscess	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Dental - Total Avulsion/Complete Tooth Loss	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Dental - Toothache	0 - Not Addressed	2 - Shall	2 - Shall	1 - Should	1 - Should	1 - Should	0 - Not Addressed	2 - Shall
Depression	0 - Not Addressed	0 - Not Addressed	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall

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Condition	(Orion ↔ ISS Transfer) Clinical Priority	(Lunar Sortie) Clinical Priority	(Lunar Outpost) Clinical Priority	(ISS Contingency) Clinical Priority	(Sortie Contingency) Clinical Priority	(Outpost Contingency) Clinical Priority	(144 Hour Depressurization) Clinical Priority	(NEA) Clinical Priority
Nosebleed (Space Adaptation)	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Osteoporosis	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Otitis Externa	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Otitis Media	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Palliative Treatment	0 - Not Addressed	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall
Paresthesias (Post-EVA)	0 - Not Addressed	1 - Should	1 - Should	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Pharyngitis	1 - Should	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Prostatitis	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Radiation Sickness	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	2 - Shall
Seizure	0 - Not Addressed	0 - Not Addressed	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall
Sepsis	0 - Not Addressed	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall
Shoulder Dislocation	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed
Sinusitis	1 - Should	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Skin Abrasion	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall

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Condition	(Orion ↔ ISS Transfer) Clinical Priority	(Lunar Sortie) Clinical Priority	(Lunar Outpost) Clinical Priority	(ISS Contingency) Clinical Priority	(Sortie Contingency) Clinical Priority	(Outpost Contingency) Clinical Priority	(144 Hour Depressurization) Clinical Priority	(NEA) Clinical Priority
Skin Laceration	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Skin Rash	1 - Should	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	1 - Should	2 - Shall
Smoke Inhalation	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	2 - Shall
Space Motion Sickness (Space Adaptation)	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall
Sprain/Strain/Overuse Syndromes	1 - Should	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	1 - Should	2 - Shall
Sudden Cardiac Arrest	0 - Not Addressed	0 - Not Addressed	1 - Should	1 - Should	0 - Not Addressed	1 - Should	0 - Not Addressed	1 - Should
Surgical Treatment	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Toxic Exposure	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall
Upper Extremity Fracture	0 - Not Addressed	0 - Not Addressed	1 - Should	0 - Not Addressed	1 - Should	1 - Should	0 - Not Addressed	1 - Should
Urinary Incontinence (Space Adaptation)	1 - Should	1 - Should	1 - Should	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	1 - Should
Urinary Retention (Space Adaptation)	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	1 - Should	2 - Shall
Urinary Tract Infection	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall	2 - Shall
Vaginal Yeast Infection	0 - Not Addressed	2 - Shall	2 - Shall	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	0 - Not Addressed	2 - Shall
Visual Impairment/Intracranial Hypertension	0 - Not Addressed	2 - Shall	2 - Shall	2 - Shall	2 - Shall	2 - Shall	0 - Not Addressed	2 - Shall

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APPENDIX A ACRONYMS AND ABBREVIATIONS

A1. ACRONYMS AND ABBREVIATIONS

CHeCS	Crew Health Care System
CO ₂	Carbon Dioxide
CR	Change Request
EVA	Extravehicular Activity
ExMC	Exploration Medical Capability
HRP	Human Research Program
IMG	Integrated Medical Group
ISS	International Space Station
JSC	Johnson Space Center
NASA	National Aeronautics and Space Administration
NEA	Near Earth Asteroid
NSBRI	National Space Biomedical Research Institute
SMCCB	Space Medicine Configuration Control Board
SMEMCL	Space Medicine Exploration Medical Condition List
TBD	To Be Determined