

Clinical Finding Form (CLiFF)

Branch

Baseline

ICL92_Space Adaptation - Constipation

The American Gastroenterological Association defines a constipation as including a constellation of possible symptoms including: hard stools, a feeling of incomplete evacuation, abdominal discomfort, bloating, abdominal distention, excessive straining, a sense of anorectal blockage during defecation, and the need for manual maneuvers during defecation. Although infrequent bowel movements (typically less than 3 per week) are commonly associated with constipation, reduced stool frequency is poorly correlated with delayed colonic transit. (Bharucha et al, 2013) Constipation is a common problem reported by astronauts. It appears to be more likely to occur in space due to the observation that crewmembers experience large bowel ileus, and decreased bowel mobility. This may be exacerbated by dehydration due to space motion sickness and hormonal responses to fluid redistribution. Maintaining hydration is encouraged. Oral and rectal bowel stimulants and psyllium wafers are available on orbit for constipation. (Marshburn et al, 2020)

INCIDENCE DATA INCLUDED IN THE MODEL

The model imports the following incidence information from the MEDPRAT Evidence Library Database: incidence data category, space adaption status, EVA status, incidence data type, incidence and occurrence distribution data and incidence data characteristics. Data category defines the type of data available for incidence calculations (i.e. raw data vs. adjusted data). Space adaptation identifies medical events that where onset occurs in the first 5-7 days of flight and does not reoccur. EVA-related incidence values identify medical events that occur only during an EVA. Incidence values types vary by data category and define the number of medical events per person-year (rates) or medical events per person at-risk (proportion) for each medical condition. Incidence values can be modified by crew characteristics such as gender sex and certain crew medical history characteristics. Modifying characteristics are noted below and incidence values are listed individually for each characteristic. Distributions are assigned to medical events incidence values and occurrences in the model. For each crewmember in a given trial, the incidence and number of occurrences of each medical condition are randomly selected from these probability distributions. Detailed descriptions of the distributions are included in the MEDPRAT Technical Description Document.

INCIDENCE DATA

SPACEFLIGHT LITERATURE

The most up to date incidence data available for Space Adaptation Constipation is from the previous IMM CLiFF update of 2017 (NASA, Constipation (Space Adaptation) CLiFF, 2017). This reports 151 Space Adaptation Constipation events from Mercury - ISS Expedition 40. This will be used to inform the incidence in this CLiFF. Dietlin and Pestov, 1984 is Volume 4 of a 5 volume series joint report between Russia and the United States. It reports a cumulative incidence rate (including both Cosmonauts and Astronauts) of 0.252 crewmembers per year. These data are from the beginning of the space program through 1982. Unfortunately it was not possible to extract the unique data from this data set to combine with the data presented in the 2017 CLiFF. Therefore, only the 2017 CLiFF data were used to inform the incidence of this condition.

ANALOG LITERATURE

Horn et al, 2003 describes a small submarine study (n = 122) in which crewmembers self-reported constipation symptoms within the first 52 days of the mission. They report an 8% incidence of constipation.

TERRESTRIAL LITERATURE

Everhart, 2008 presents NIH ambulatory care data for first visit, diagnosis of "chronic constipation" in patients ages 15-44. The incidence values reported are 478 per 100,000 for age 15-44 (0.0048 per person), and 696 per 100,000 for age 45-64 (0.0069 per person). Gender incidence was not stratified by age, female 1267 and male 866 per 100,000.

OVERALL INCIDENCE SUMMARY

INCIDENCE

Mean: 0.1877
SD: 0.01371

INCIDENCE SUMMARY

The 2017 IMM CLiFF was used to inform the incidence distribution for this condition (NASA, Constipation (Space Adaptation) CLiFF, 2017). It reported a total 151 events over 807 person-missions. IP: 0.1871 (95%CI: 0.1608, 0.2158). The Bayesian posterior distribution for the incidence

proportion given the spaceflight data (151 events over 807 person-missions) under an uninformative prior is Beta(shape1=152.07, shape2=658.09) with mean 0.1877 and SD 0.01371.

TABLE 1. INCIDENCE MODEL

Incidence Details
Incidence Type
SAS
Segment
Space Adaptation
Env. Exposure
NA
Sex
Any
Crowns
Any
Contacts
Any
Pregnancy
Any
Incidence Distribution
Occurrence Dist
Binomial
Incidence Dist.
Beta
Mean
0.187704
SD
0.0137101
Beta
(Alpha): 152.07
(Beta): 658.09
Onset Timing (Hours)
(Min): 1
(Max): 120
(Most Likely): 12

TABLE 2. INCIDENCE LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Dietlin and Pestov, 1984	Spaceflight	3
NASA, Constipation (Space Adaptation) CLIFF, 2017	Spaceflight	4
Horn et al, 2003	Analog	1
Everhart, 2008	Terrestrial	0

The NASA, Constipation (Space Adaptation) CLIFF, 2017 reports 151 cases of constipation in US crewmembers from Mercury - ISS Expedition 40. Dietlin and Pestov, 1984 is a joint US/Russian report that presents a combined incidence (Russian and US) of constipation of 0.252 crewmembers/year before 1983. Horn et al, 2003 is a small submarine analog study that reports 8% of crewmembers (n=122) experienced constipation within the first 52 days of their mission. Everhart, 2008 is NIH data that presents incidence of constipation in all comers ages 15-44 (478 per 100,000, 0.0048 per person), and ages 45-64 (696 per 100,000, 0.0069 per person). The most applicable data for this CLIFF is the spaceflight data.

CREWMEMBER SELECTION/PREVENTION

DISQUALIFYING CONDITIONS

Refer to Medical Evaluation Documents (MED) Volume A, Medical Standards for ISS Crewmembers, International Space Station Program, Rev 3.4 (2016).

PREFLIGHT PREVENTATIVE MEASURES

There are no required pre-flight preventive measures for Space Adaptation Constipation, but some crewmembers opt to either have a liquid diet for 2-3 days prior to launch or undergo bowel preparations before launch to reduce the need for bowel movements in transit to ISS in the Soyuz spacecraft. (Marshburn et al, 2020)

BEST CASE SCENARIO DEFINITION

Symptomatic complaints of constipation, requiring treatment with hydration and dietary changes.

WORSE CASE SCENARIO DEFINITION

Symptomatic complaints of constipation that do not respond to initial treatment and require medication and/or disimpaction.

CONDITIONS INCLUDED, BUT NOT EXPLICITLY STATED (CNES)

Fecal Impaction

BEST CASE/WORST CASE PROBABILITY COMMENTS

The IMM CLIFF Real World System update of 2017 reported 38 new events of Space Adaptation Constipation (ISS Expedition 14-40). Of these cases, 33 events were from STS missions and 5 were from ISS Missions. Of the 28 new cases, 6 were defined as worst-case. The IMM worst-case scenario definition is essentially equivalent to the current worst-case scenario definition. The IMM worst-case scenario definition was, "Symptomatic complaints of constipation that do not respond to initial treatment." The current worst-case scenario definition is, "Symptomatic complaints of constipation that do not respond to initial treatment and require medication and/or disimpaction." The only difference in the current definition is that it lists treatment options. Thus, it is appropriate to assign a worst-case scenario probability of 15.79% (6/38) and a best-case scenario probability of 84.21% (26/38).

TABLE 3.BEST/WORST CASE PROBABILITY LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
NASA, Constipation (Space Adaptation) CLIFF, 2017	Spaceflight	4

The IMM CLIFF Real World System update of 2017 reported 38 new events of Space Adaptation Constipation (ISS Expedition 14-40). Of these cases, 33 events were from STS missions and 5 were from ISS Missions. Of the 28 new cases, 6 were defined as worst-case. The IMM worst-case scenario definition is essentially equivalent to the current worst-case scenario definition. The IMM worst-case scenario definition was, "Symptomatic complaints of constipation that do not respond to initial treatment." The current worst-case scenario definition is, "Symptomatic complaints of constipation that do not respond to initial treatment and require medication and/or disimpaction." The only difference in the current definition is that it lists treatment options. Thus, it is appropriate to assign a worst-case scenario probability of 15.79% (6/38) and a best-case scenario probability of 84.21% (26/38).

TABLE 4. CLIFF TREATMENT & OUTCOME TABLE BY CLINICAL PHASE

Case Scenario	Composite Incidence	Condition Probability %	CP1: Diagnosis		CP2: Treatment			CP3: Condition End State				
			TI%	Duration	TI%	Duration		TI%	RTDC	LOCL		
			Preset	Preset	Preset	Min	Max	Preset	Min%	Max%	Min%	Max%
Treated Best Case (TBC)	Mean: 0.1877 SD: 0.01371	84 - 84	100	0.45	0	0	72	0	0	0	0	0
Treated Worst Case (TWC)		16 - 16	100	0.5	13.553	72	120	0	0	0	0	0
Untreated Best Case (UTBC)	N/A	N/A	N/A	0.45	0.172735	0	72	0	0	0	0	0
Untreated Worst Case (UTWC)	N/A	N/A	N/A	0.5	17.6986	72	120	0	0	0	0	0

TABLE 4 KEY

Composite Incidence: The same composite incidence will be used for both TBC and TWC. For EVA conditions: events per EVA (events/EVA). For space adaptation conditions: events per person (events/person). For non-spaceflight conditions: events per person year (events/py).

Condition Probability: The probability that CLIFF condition progresses to a worst case scenario. Best case scenario: 100%-Worst Case.

Clinical Phase General Comments:

- TI% = Task Impairment %. Task Impairment is the % of tasks that the crewmember is incapable of performing without impairment secondary to the medical condition.
- Durations are defined in hours.
- Removal to Definitive Care (RTDC): The probability the entire crew aborts the mission and returns to earth. This is considered as a condition end state result if any of the following criteria are met: 1) the potential for LOCL, 2) potential for significant permanent task impairment, or 3) potential for intractable pain.
- Loss of Crew Life (LOCL): The probability of death of affected crewmember due to medical condition.

Clinical Phase 1: Initial Assessment and Diagnosis:

- Covers only the initial assessment and diagnosis of the affected crewmember to define his or her medical condition. While the affected crewmember is being assessed, he or she is not able to perform any assigned tasks, thus Task Impairment (TI) during this phase is considered 100%. In the untreated case, there is no diagnosis performed, therefore Task Impairment and Duration will always be "not applicable."

Clinical Phase 2: Stabilization, Treatment, and Convalescence:

- The affected crewmember is receiving any appropriate initial or follow-on treatment for his or her medical condition to allow the crewmember to recover as much as he or she is able to recover in the spaceflight environment. Clinical phase 2 also encompasses relapses or recurrences of the same original medical condition in Clinical Phase 1. The duration of Clinical Phase 2 is expressed as minimum and maximum hours.

Clinical Phase 3: Condition End State:

- Reached once the affected crewmember has recovered from the medical condition as much as he or she is able to recover in the spaceflight environment amongst treated and untreated best and worst case scenarios. This may or may not be recovery from the given medical condition to the full extent possible. If this "recovered" state results in Removal to Definitive Care (RTDC) or Loss of Crew Life (LOCL) this will be noted in the condition end state results.

SCENARIO OVERVIEW COMMENTS

All durations for this CLIFF are taken from the IMM CLIFF values due to a paucity of data in the literature regarding the duration of Space Adaptation Constipation. The Clinical and Science Team of ExMC pre-determined that the probability of RTDC was 0% for all scenarios and no surrogate searches were performed. The student effort for literature review assumed that mortality would not result from any scenario and LOCL was assigned 0% for all scenarios. No literature searches for LOCL were performed.

TREATED BEST CASE (TBC) SCENARIO COMMENTS

The IMM 2017 CLIFF was used to inform the duration values for this CLIFF due to a paucity of data regarding the duration of Space Adaptation Constipation in the literature. A duration of 0-72 hours from the prior CLIFF was assigned to this scenario. The Clinical and Science Team of ExMC pre-determined that the probability of RTDC for all scenarios would be 0%. No RTDC literature searches were performed and the RTDC probability was accordingly assigned 0%. It was assumed that a best-case scenario case of Space Adaptation Constipation would not result in any mortality. The LOCL probability was assigned 0%. No literature search for LOCL was performed.

TREATED WORST CASE SCENARIO (TWC) COMMENTS

The IMM 2017 CLIFF was used to inform the duration values for this CLIFF due to a paucity of data regarding the duration of Space Adaptation Constipation in the literature. A duration of 72-120 hours from the prior CLIFF was assigned to this scenario. The Clinical and Science Team of ExMC pre-determined that the probability of RTDC for all scenarios would be 0%. No RTDC literature searches were performed and the RTDC probability was accordingly assigned 0%. It was assumed that a treated worst-case scenario of Space Adaptation Constipation would not result in mortality. The LOCL probability was assigned 0%. No literature search for LOCL was performed.

UNTREATED BEST CASE (UTBC) SCENARIO COMMENTS

The IMM 2017 CLIFF was used to inform the duration values for this CLIFF due to a paucity of data regarding the duration of Space Adaptation Constipation in the literature. A duration of 0-72 hours from the prior CLIFF was assigned to this scenario. The Clinical and Science Team of ExMC pre-determined that the probability of RTDC for all scenarios would be 0%. No RTDC literature searches were performed and the RTDC probability was accordingly assigned 0%. It was assumed that an untreated best-case scenario of Space Adaptation Constipation would not result in mortality. The LOCL probability was assigned 0%. No literature search for LOCL was performed.

UNTREATED WORST CASE (UTWC) SCENARIO COMMENTS

The IMM 2017 CLIFF was used to inform the duration values for this CLIFF due to a paucity of data regarding the duration of Space Adaptation Constipation in the literature. A duration of 72-120 hours from the prior CLIFF was assigned to this scenario. The Clinical and Science Team of ExMC pre-determined that the probability of RTDC for all scenarios would be 0%. No RTDC literature searches were performed and the RTDC probability was accordingly assigned 0%. It was assumed that an untreated worst-case scenario of Space Adaptation Constipation would not result in mortality. The LOCL probability was assigned 0%. No literature search for LOCL was performed.

TABLE 5. CLINICAL PHASE II DURATION LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
NASA, Constipation (space adaptation) CLIFF, 2017	Spaceflight	3

Due to a paucity of data available in the literature, the IMM 2017 CLIFF duration values were used to inform all scenarios of this CLIFF.

TABLE 6. RTDC LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
N/A	N/A	3

The Clinical and Science Team of ExMC pre-determined that the probability of RTDC for all scenarios would be 0%. No RTDC literature searches were performed and the RTDC probability was accordingly assigned 0% for all scenarios. Notably, the prior CLiFF assigned 0% RTDC probability to all scenarios.

TABLE 7. LOCL LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
N/A	N/A	3

It was assumed for all scenarios that Space Adaptation Constipation would not result in mortality. The LOCL probability was assigned 0% for all scenarios. No literature search for LOCL was performed. Notably, the prior CLiFF assigned 0% LOCL probability to all scenarios.

CAPABILITY RESOURCE TABLE (CRT) OVERVIEW

Capabilities and Resourcing Scope

Overview

Space adaptation constipation resolves on own in first few days but has lasted up to 1 week with hydration and watchful waiting being the main treatments. When necessary, psyllium is often used by NASA astronauts in the ISS era while the Russians use aggressive pre mission bowel prep. This has a low mission impact but is very common and uncomfortable. Some research suggests this may have a psychiatric component or be related to decreased gut motility? (based on physical exams on orbit), however the most common cause is presumed to be dehydration related to decreasing water intake before launch and subsequent fluid losses on orbit.

CNES: NONE

Diagnostic Scope and Resourcing

Diagnosis relies on history and physical exam

Clinical Phase 1 Duration and Rationale

This version of IMPACT presumes physician level knowledge, skill, and ability will be present on the mission. The CRT working group SME consensus duration is as follows:

CP1 BC (Treated or Untreated): 0.45 hours for set up, history, and physical exam.

CP1 WC (Treated or Untreated): 0.5 for a set up, history, and a more thorough exam given increased symptom severity.

This condition requires a Scope of Practice 4 to manage and rule out other similar presenting conditions, assess treatment response, and assess fitness for duty. However, most of the treatment will not rise above level 1.

Treatment Scope and Resourcing

The best case is mild and uses only hydration. The worst case adds, psyllium, a soap water enema, bisacodyl, and fecal disimpaction per the definition.

Communications and Support Needs;

Communications are not expected to be necessary beyond the routine medical ground communications given the context and frequency of this condition. However, it is expected that routine ground communication will be present and available to assist with treatment.

References

Barratt, Michael R., Ellen S. Baker, and Sam L. Pool. 2019. "Principles of clinical medicine for space flight." In. New York, NY: New York, NY : Springer.

IMM CLIFF RECONCILIATION COMMENTS

The IMM CLiFF indicated that peak occurrence was at 24 hours and restricted the occurrence range to 24-192 hours into the mission. EVAC and LOCL probabilities were 0% for all scenarios. The best and worst-case scenario definitions are functionally unchanged. The IMM best-case scenario definition was, "Symptomatic complaints of constipation, requiring minimal to no treatment," whereas the current best-case scenario definition is, "Symptomatic complaints of constipation, requiring treatment with hydration and dietary changes." The only change is that the definition now details the treatment. The IMM worst-case scenario definition was, "Symptomatic complaints of constipation that do not respond to initial treatment." The current worst-case scenario definition is, "Symptomatic complaints of constipation that do not respond to initial treatment and require medication and/or disimpaction." Again, the current definition lists treatment options. Note that this CLiFF re-uses the duration values from the prior IMM CLiFF for all scenarios due to a paucity of data in the literature regarding the duration of Space Adaptation Constipation.

LIMITATIONS SUMMARY

- The paucity of data available in the literature regarding the duration of Space Adaptation Constipation resulted in re-using the durations from the IMM CLIFF.
- The student effort for the literature reviews assumed that LOCL probability for all scenarios would be 0%. While this is likely a reasonable assumption, no literature searches were performed to substantiate this.

TABLE 8. TASK IMPAIRMENT CALCULATION BASED ON AFFECTED HUMAN SYSTEMS TASK CATEGORIES (HSTC)

Clinical Phase 2: Treatment												
	Affected HSTCs											
	Cognitive - Simple	Cognitive - Complex	Communications	Inter-personal Skills	Vision	Hearing	Cardio-pulmonary	Dentition	GI	GU		
Treated Best Case (TBC)												
Untreated Best Case (UTBC)									13			
Treated Worst Case (TWC)		664							13			
Untreated Worst Case (UTWC)	223	664		89					13			
	Affected HSTCs (Continued)								TI Calculation		TI Score	
	Hand (Dom)	Hand (Any)	Upper Extremity	Lower Extremity	Ambul & Standing (g)	Translation & Stabilization (microgravity)	Don/Doff Equipment	Pressure Ops	Total Tasks Impaired By Condition	Total Human System Category Tasks Full Mission	TI Decimal	TI %
Treated Best Case (TBC)									0	3763	0	0
Untreated Best Case (UTBC)									13	3763	0.00345469	0.345469
Treated Worst Case (TWC)	132							211	1020	3763	0.27106	27.106
Untreated Worst Case (UTWC)	132							211	1332	3763	0.353973	35.3973
Clinical Phase 3: Condition End State												
	Affected HSTCs											
	Cognitive - Simple	Cognitive - Complex	Communications	Inter-personal Skills	Vision	Hearing	Cardio-pulmonary	Dentition	GI	GU		
Treated Best Case (TBC)												
Untreated Best Case (UTBC)												
Treated Worst Case (TWC)												
Untreated Worst Case (UTWC)												
	Affected HSTCs (Continued)								TI Calculation		TI Score	

	Hand (Dom)	Hand (Any)	Upper Extremity	Lower Extremity	Ambul & Standing (g)	Translation & Stabilization (microgravity)	Don/Doff Equipment	Pressure Ops	Total Tasks Impaired By Condition	Total Human System Category Tasks Full Mission	T1 Decimal	T1 %
Treated Best Case (TBC)									0	3763	0	0
Untreated Best Case (UTBC)									0	3763	0	0
Treated Worst Case (TWC)									0	3763	0	0
Untreated Worst Case (UTWC)									0	3763	0	0

TABLE 8 KEY

Human System Task Category (HSTC) Definitions: Cognitive-Simple: Tasks requiring simple cognitive involvement (low levels of attention, following simple checklists, and not requiring extensive decision making) in conjunction with inputs from other systems. Cognitive-Complex: Tasks requiring complex cognitive involvement (requiring constant attention, frequent interpretation of outside stimuli to inform real-time situations) in conjunction with inputs from other systems. Communication: Tasks requiring primarily communication, via hearing and speaking. Interpersonal Skills: Tasks requiring interpersonal, social interaction between crew including complex technical tasks that require extended crew interaction. Vision: Tasks in which visual information is required. Hearing: Tasks in which primarily auditory information is required, excluding communication, e.g. hearing alarms, medical auscultation, OOHAs. Cardiopulmonary: Tasks requiring greater-than-baseline cardiopulmonary effort, e.g. physically strenuous activities. Dentition: Tasks requiring use of teeth for mastication. GI (Gastrointestinal): Tasks requiring use of the alimentary system, e.g. solids/liquids consumption and solids excretion. GU (Genitourinary): Tasks requiring use of the male/female genitourinary systems. Hand (Dominant): Tasks performed using primarily the hand, requiring use of the dominant hand (piloting, medical procedures, dental procedures). Hand (Any): Tasks performed using primarily the hand(s), with no preference for dominance, with equivalent bilateral effectiveness. Upper Extremity: Tasks requiring specific use of the upper extremities, excluding hands. Lower Extremity: Tasks requiring specific use of the lower extremities (excluding ambulation and standing in the presence of gravity), e.g. using exercise equipment. Ambulation and Standing (g): Tasks requiring use of both lower extremities to accomplish ambulation or standing in the presence of gravity. Translation and Stabilization (microgravity): Tasks requiring use of either the upper or lower extremities to accomplish translational movement and stabilization (securing oneself to remain stationary) in the setting of microgravity. Don/Doff Equipment: Tasks requiring the donning of personal equipment (including pressure suit, exercise harness, EVA equipment, etc). Pressure Ops: EVA/contingency tasks performed while pressurized in a suit.

Criteria for Assignment of Conditions to HSTCs (any of the following):

- 1) Is affected crew member physically incapable of performing the human system task category, without impairment, with the condition?
- 2) Would the treatment (e.g. medications) impair the crewmember's ability to perform the human system task category? (Does not apply to UTx)
- 3) Does the condition have a high likelihood of causing a significant aeromedical contraindication with an associated human system task category?
- 4) Would performing tasks in an associated task category worsen the condition? (If so, it is affected).
- 5) Does pain associated with the condition impair any further human system categories?

TASK IMPAIRMENT COMMENTS

CP2: No comment. CP3: No comment.

EVIDENCE COLLECTION PROCESS

Mesh terms that most closely resembled the best-case and worst-case scenarios, and associated Conditions Included but Not Explicitly Stated (CNES), were utilized to build incidence, duration, RTDC, and LOCL searches by best- and worst-case.

Incidence:

Databases searched for spaceflight and analog incidence data included: PubMed, Google Scholar, NASA Technical Reports Server (NTRS) public search, Defense Technical Information Center (DTIC), and Barratt MR, Baker E, Pool SL. Principles of Clinical Medicine for Space Flight. New York, NY: Springer; 2019. 2nd Edition. Databases searched for terrestrial incidence included: DynaMed, PubMed, and Google Scholar.

Duration, RTDC, LOCL:

Databases searched for duration, RTDC, and LOCL included: Dynamed, Cochrane, PubMed, and Google Scholar. Note, that if duration, RTDC, or LOCL data was found in a DynaMed search, the other search engines were not included. Relevant articles were selected and reviewed. If applicable, the article was included in the CLIFF.

LEVEL OF CONFIDENCE (LOC) SCORING

Articles obtained to update the evidence behind this CLIFF were scored by ExMC editors, based on their applicability to the Exploration Spaceflight environment using the following grading scale:

- 4 – Confident
- 3 – Somewhat confident
- 2 – Neutral
- 1 – Somewhat unconfident
- 0 – Not confident

The following considerations factor into the grading scale above:

- How closely does the paper describe the medical condition as defined by the IMPACT 1.0 Condition List (relevance)?
- How closely does the population included resemble the astronaut population?
- Quality of the paper (number of subjects, methods, etc.)
- How much does the editor trust the source of the evidence?
- How closely does the editor think that the data represents the exploration spaceflight environment?
- Other considerations, at the discretion of the editor, supported in the comments for LOE scoring.

REFERENCES

Reference

1. Bharucha AE, Dorn SD, Lembo A, Pressman A. American Gastroenterological Association Medical Position Statement on Constipation. *Gastroenterology*. 2013;144:211-7.
2. Marshburn TH, Lindgren KN, Moynihan S. Acute Care. In: Barratt MR, Baker ES, Pool SL, editors. *Principles of Clinical Medicine for Space Flight*. 2 ed. New York: Springer; 2020. p. 457 – 80.
3. NASA. Constipation (space adaptation) Clinical Information Findings Form. Integrated Medical Database of the Human Health and Performance Contract Integrated Medical Model Project. 2017;v6.5.

ACRONYMS

ACRONYM	PHRASE
AAOMS	American Association of Oral and Maxillofacial Surgeons
AMA	American Medical Association
ARCL	All Remaining Conditions List
ARS	Acute Radiation Sickness
BHP	Behavioral Health and Performance
CAC	Coronary Artery Calcium
CHS	Crew Health and Safety
CL	Condition List
CIFF	Clinical Finding Form
CMO	Crew Medical Officer
COMFORT	Clinical Outcome Metrics for Optimization of Robust Training
CP1	Clinical Phase 1
CP2	Clinical Phase 2
CP3	Clinical Phase 3
CRL	Clinical Resource Level
CRT	Capability Resource Table
CST	Clinical Science Team
DCS	Decompression Syndrome
DRM	Design Reference Mission
ED	Emergency Medicine Doctor
EL	Evidence Library
EMCL	Exploration Medical Condition List
EMT	Emergency Medical Technician
EVA	Extravehicular Activity
EXMC	Exploration Medical Capability
HRP	Human Research Program
ICD	International Classification of Disease
ICL 1.0	IMPACT 1.0 Medical Conditions List

ICU	Intensive Care Unit
IMCL	iMED Condition List
IMED	Integrated Medical Evidence Database
IMM	Integrated Medical Model
IMPACT-MD	Impact Medical Database
IP	Incidence Proportion
IR	Incidence Rate
ISS	International Space Station
IV	Intravenous
JSC	Johnson Space Center
LEO	Low-Earth orbit
LEVA	Lunar Extravehicular Activity
LOCL	Loss of Crew Life
LOM	Loss of Mission
LSAH	Lifetime Surveillance of Astronaut Health
LSO	Lunar Surface Operations
MCL	Master Condition List
MEVA	Medical Extravehicular Activity
NASA	National Aeronautics and Space Administration
N/A	Not Applicable
NP	Nurse Practitioner
OBGYN	Obstetrics and Gynecology
OR	Occurrence Rate
PA	Physician Assistant
PDQ	Pain Disability Questionnaire
PFCL	Proposed Future Conditions List
PPE	Personal Protective Equipment
PTRS	Project Technical Requirements Specification
PRL	Pharmaceutical Resource Level
QTL	Quality Time Lost
RCL	Removed Conditions List
REP	Rochester Epidemiology Study
RTDC	Removal to Definitive Care
SANS	Spaceflight-Associated Neuro-ocular Syndrome
SAS	Space Adaptation Syndrome
SEVA	Spaceflight Extravehicular Activity
SME	Subject Matter Expert
SoP	Standard Operating Procedure
SPE	Solar Particle Event
TBD	To Be Determined
TI	Task Impairment