

Clinical Finding Form (ClIFF)

Branch

Baseline

ICL98_Space Adaptation - Urinary Retention

Urinary retention is the inability to voluntarily pass urine or completely empty the bladder. It may be without pain or accompanied by painful, palpable or percussible bladder. The retention volume should be significantly greater than the expected normal bladder capacity (Abrams, 2002). Numerous possible contributors can play a part in this condition including obstruction, anticholinergic/sympathetic drugs, stress, environmental/social factors, urinary track infection, and microgravity. Space adaptation indicates that it occurs within the first 5 days of flight.

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

Space adaptation urinary retention has a higher occurrence during the early phase of spaceflight while the body is adapting to microgravity. The incidence of space adaptation urinary retention (specifically occurring within the first 5 days of spaceflight) has been estimated based on LSAH inflight data.

ANALOG LITERATURE

Not applicable. No analog literature search completed due to this being a space adaptation condition.

TERRESTRIAL LITERATURE

Not applicable. No terrestrial literature search completed due to this being a space adaptation condition.

OVERALL INCIDENCE SUMMARY

INCIDENCE

Male: mean 0.00857, sd 0.003478 and female: mean 0.06, sd 0.0223

INCIDENCE SUMMARY

Incidence proportion distributions depend on sex. Males: Bayesian posterior distribution for the incidence proportion using the spaceflight data of 5 events over 692 person-missions under a uniform(0,1) prior is Beta(shape1=6.011, shape2=695.39) mean: 0.00857 and SD: 0.003478. Females: Bayesian posterior distribution for the incidence proportion using the spaceflight data of 6 events over 115 person-missions under a uniform(0,1) prior is Beta(shape1=6.745, shape2=105.67) mean: 0.06 and SD: 0.0223.

TABLE 1. INCIDENCE MODEL

Incidence Details

Incidence Type

SAS

Segment

Space Adaptation

Env. Exposure
NA

Sex
Male

Crowns
Any

Contacts
Any

Pregnancy
Any

Incidence Distribution

Occurrence Dist
Binomial

Incidence Dist.
Beta

Mean
0.00856999

SD
0.00347799

Beta
(Alpha): 6.011
(Beta): 695.39
Onset Timing (Hours)
(Min): 1
(Max): 120
(Most Likely): 12

Incidence Details

Incidence Type
SAS

Segment
Space Adaptation

Env. Exposure
NA

Sex
Female

Crowns
Any

Contacts
Any

Pregnancy
Any

Incidence Distribution

Occurrence Dist
Binomial

Incidence Dist.
Beta

Mean
0.0600009

SD
0.0223001

Beta
(Alpha): 6.745
(Beta): 105.67
Onset Timing (Hours)
(Min): 1
(Max): 120
(Most Likely): 12

TABLE 2. INCIDENCE LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Walton, 2010	Spaceflight	4
Saile, 2017a	Spaceflight	4

LOC = 4 (confident) based on LSAH 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 specific preflight preventive measures for this spaceflight specific condition.

BEST CASE SCENARIO DEFINITION

Urinary retention that resolves spontaneously or requires one-time straight catheterization for resolution.

WORSE CASE SCENARIO DEFINITION

Urinary retention that requires repeated straight catheterization or indwelling catheter.

CONDITIONS INCLUDED, BUT NOT EXPLICITLY STATED (CNES)

None

BEST CASE/WORST CASE PROBABILITY COMMENTS

Including newer data in which there was one worst case reported, improved characterization of best and worst case scenario probabilities are now at 91% best case and 9% worst case scenarios respectively when combined with LSAH spaceflight data from the previous IMM CLIFF.

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

Citation	Source	LOC Value
Stepaniak, 2007	Spaceflight	3

LOC = 3 (somewhat confident) based on limited LSAH spaceflight data.

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)	male - mean: 0.00857 and SD: 0.003478, female - mean: 0.06 and SD: 0.0223	91 - 91	100	0.666	5.76668	0	24	0	0	0	0	0
Treated Worst Case (TWC)		9 - 9	100	0.666	23.4122	24	240	0	0	0	0	0
Untreated Best Case (UTBC)	N/A	N/A	N/A	0.666	27.2655	0	24	0	0	100	0	0
Untreated Worst Case (UTWC)	N/A	N/A	N/A	0.666	39.6492	24	240	39.6492	50	100	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

This condition falls within space adaptation syndrome phase specifically. The treatment does not differ significantly to that of the terrestrial equivalent and can usually be treated inflight with adequate training and supplies. Best case Clinical Phase II scenarios will last 0-24 hours. Worst case Clinical Phase II scenarios, refractory retention poses the issue there is a problem that cannot be resolved inflight either due to inadequate resources or required skill sets, and therefore increases the risk for RTDC, lasting 24-240 hours in duration. (Stepaniak, 2007)

TREATED BEST CASE (TBC) SCENARIO COMMENTS

Occurrence and duration data comes directly from spaceflight data (LSAH) in the prior IMM CLIFF. The best case scenarios can last up to 24 hours maximum and with quick resolution requiring at most a single intervention (e.g. straight catheterization) or spontaneously resolve. RTDC probability for the treated best case scenario is 0% based on the best case definition.

TREATED WORST CASE SCENARIO (TWC) COMMENTS

Occurrence and duration data comes directly from spaceflight data (LSAH) in the prior IMM CLIFF. The worst case scenarios can last 24-240 hours. (Stepaniak, 2007) These cases require repeated straight catheterization or indwelling catheter placing the astronaut for other conditions, such as urinary track infection, neurogenic bladder, or sepsis if not properly addressed/treated. The RTDC deemed at 0% with LOCL deemed 0% presuming adequate supplies and training.

UNTREATED BEST CASE (UTBC) SCENARIO COMMENTS

Occurrence and duration data comes directly from spaceflight data (LSAH) in the prior IMM CLIFF. The best case scenarios can last up to 24 hours maximum and with quick resolution that spontaneously resolves or may require treatment with intermittent catheterization. RTDC probability is deemed at 0-100% to account for the possibility that intermittent catheterization is required but that this capability will not be available. LOCL is deemed to be 0% as this outcome is not expected.

UNTREATED WORST CASE (UTWC) SCENARIO COMMENTS

Occurrence and duration data comes directly from spaceflight data (LSAH) in the prior IMM CLIFF. The worst case scenarios can last 24-240 hours. (Stepaniak, 2007) Untreated, this will place the astronaut at risk for other conditions, such as urinary track infection, neurogenic bladder, or sepsis if not properly addressed/treated. RTDC probability deemed at 100% but with LOCL deemed 0%.

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

Citation	Source	LOC Value
Walton, 2010	Spaceflight	3
Saile, 2017a	Spaceflight	
Stepaniak, 2007	Spaceflight	

Clinical Phase II durations are given an LOC = 3 (somewhat confident) based on limited LSAH spaceflight data.

TABLE 6. RTDC LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Walton, 2010	Spaceflight	

Citation	Source	LOC Value
Saile, 2017a	Spaceflight	3
Stepaniak, 2007	Spaceflight	

RTDC is given an LOC = 3 (somewhat confident) based on limited LSAH spaceflight data.

TABLE 7. LOCL LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Walton, 2010	Spaceflight	4
Saile, 2017a	Spaceflight	
Stepaniak, 2007	Spaceflight	

LOCL is given an LOC = 4 (confident) based on limited LSAH spaceflight data.

CAPABILITY RESOURCE TABLE (CRT) OVERVIEW

Overview

Urinary retention is the inability to completely empty one's bladder. This condition is exclusive to space adaptation syndrome (SAS)-related urinary retention which was been reported during the first 48 hours of spaceflight and does not include chronic conditions such as chronic neurologic origins of urinary retention of benign prostatic hypertrophy that may require chronic pharmacologic management. This condition remains clinically significant given the risk of discomfort/pain leading to task impairment or increasing the risk of urinary tract infections.

CNES: None

Diagnostic Scope and Resourcing

The medical history should review any personal history of urinary retention in the past. Workup begins with an abdominal exam and can be confirmed with simple abdominal ultrasound. More advanced physical exams are likely unnecessary as conditions like enlarged prostate or pelvic organ prolapse would likely have been found during pre-flight exams thus lowering the risk of these etiologies. As this condition is acute even labs like a urinalysis and basic metabolic panel or renal imaging are felt to be beyond the scope. Even more advanced screening for non-SAS-related urinary retention inclusive of brain imaging, cystoscopy, or urodynamic studies are far outside the scope of this condition and would be considered for chronic urinary retention.

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): 0.666

CP1 WC (Treated or Untreated): 0.666

The highest scope of practice required for diagnosis includes the interpretation of the ultrasounds which is SOP 4 (intern physician).

Treatment Scope and Resourcing

As this condition is specific to space adaptation, the treatment is limited. For the best case, just a one-time straight catheterization is felt to resolve the condition per the definition. For the worst-case scenario, the urinary retention may last longer than just one catheterization and may require repeated straight catheterizations or insertion of a normal foley catheter. Thus, both of these have been scoped into the condition. Furthermore, tamsulosin can also be used and is added to the treatment resourcing.

Communications and Support Needs

Ground communication is not required. References

Serlin DC, Heidelbaugh JJ, Stoffel JT. Urinary Retention in Adults: Evaluation and Initial Management. Am Fam Physician. 2018 Oct 15;98(8):496-503. PMID: 30277739.

IMM CLIFF RECONCILIATION COMMENTS

Updated CLIFF is based on the prior IMM CLIFF documentation with minor additional information. These prior CLIFFs are based on direct astronaut spaceflight data/LSAH data. New information provides a worst case scenario estimate of 9% compared to the previous theoretical 0-17% probability. (Stepaniak, 2007) Conversely, the best case scenario estimate becomes 91% with this new information versus the previous 83-100% in the IMM CLIFF. Worst Case Clinical Phase II scenario duration is now estimated at 240 hours from the prior 120 hours as well. (Stepaniak, 2007) The probability for RTDC becomes 100% in the untreated worst case. An untreated best case scenario remains at 0-100% probability for RTDC. There is still a 0% estimate that space adaptation space adaptation urinary retention will result in loss of crew life (LOCL).

LIMITATIONS SUMMARY

The primary limitations of the data retrieved consists of a limited number of subjects/sample size, vehicles and mission profiles. The Clinical Phase II durations for this CLiFF were all taken from the IMM CLiFF which is based on LSAH data. The ExMC composer/editor of this CLiFF does not have access to that primary source, but felt after looking through multiple other sources that these estimates for duration were reasonable given they are spaceflight specific.

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)										6		
Untreated Best Case (UTBC)		664					145			6		
Treated Worst Case (TWC)		644								6		
Untreated Worst Case (UTWC)	223	644		89			145			6		
	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)								221	217	3763	0.0576668	5.76668
Untreated Best Case (UTBC)								211	1026	3763	0.272655	27.2655
Treated Worst Case (TWC)								211	881	3763	0.234122	23.4122
Untreated Worst Case (UTWC)	132			22				211	1492	3763	0.396492	39.6492
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)	223	664		89			145			6		
	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)	132			22				211	1492	3763	0.396492	39.6492

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. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, et al. The Standardisation of Terminology of Lower Urinary Tract Function. Report from the Standardisation Sub-Committee of the ICS. International Continence Society; 2002. Report No.: 21.
2. American Medical Association. Guides to the Evaluation of Permanent Impairment. 6th ed. Chicago: American Medical Association Press; 2008.
3. Inflight Compilation Lockdown. In-flight medical events for Apollo, MIR, ISS, Skylab, and STS. 7-10-2008. Houston, Texas, NASA, Johnson Space Center.
4. International Space Station Integrated Medical Group. Medical Checklist ISS- All Expeditions. Houston: National Aeronautics and Space Administration; 2008.
5. International Space Station Program. Medical Standards for ISS Crewmembers - MED Vol A. 3.2 ed. NASA; 2011.
6. Jones JA, Pietrzyk RA, Whitson PA. Renal and Genitourinary Concerns. In: Barratt M, Pool S, editors. Principles of Clinical Medicine for Space Flight. New York: Springer; 2008. p. 273-91.
7. NASA Mission Operations Directorate (MOD). International Space Station Integrated Medical Group Medical Checklist. Mission Operations Directorate (MOD), Systems Operations Data File (SODF) . 6-24-2011. Houston, TX, National Aeronautics and Space Administration (NASA).
8. Saile L., Boley L, Kerstman E. Integration RWS ISS STS Observed Incidence V2. 2017a.
9. Saile L., Boley L, Arellano J, Kerstman E. iMED Best and Worst Case Percentage Update. 2017b.
10. Santucci R, Joyce GF, Wise M. Male Urethral Stricture Disease. The Journal of Urology 2007;177:1667-74.
11. Santucci RA, Payne CK, Anger JT, Saigal CS. Office dilation of the female urethra: a quality of care problem in the field of urology. J Urol 2008 Nov;180(5):2068-75.
12. Stepaniak PC, Ramchandani SR, Jones JA. Acute urinary retention among astronauts. Aviat Space Environ Med 2007 Apr;78(4 Suppl):A5-A8.
13. Walton M, Kerstman E, IMM. In-flight Compilation v20100414_Incidence_calculation. 2010.

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
ClIFF	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